THE INSTITUTE OF PETROLEUM REVIEW

V. 14 #163

July 1960

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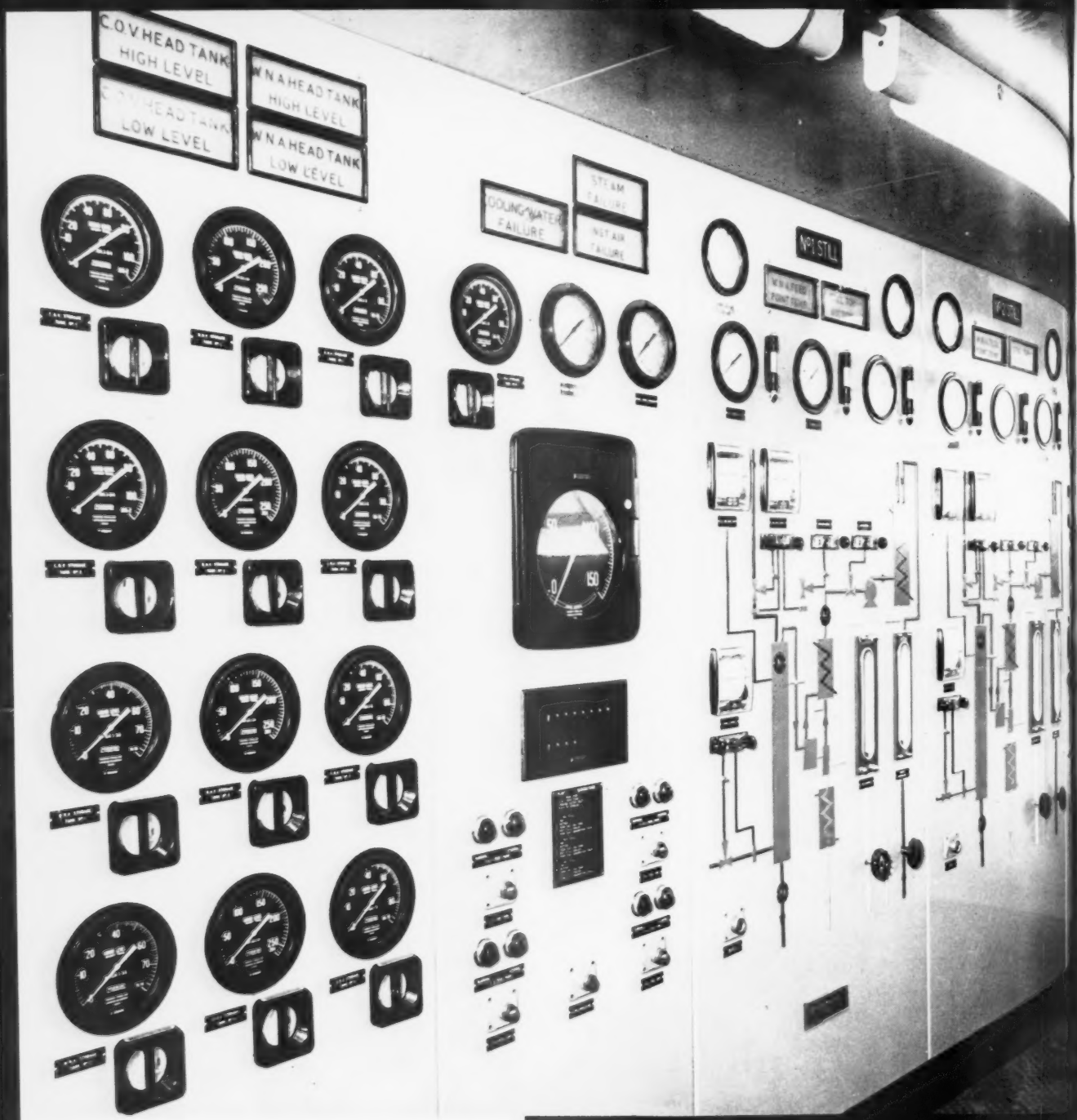

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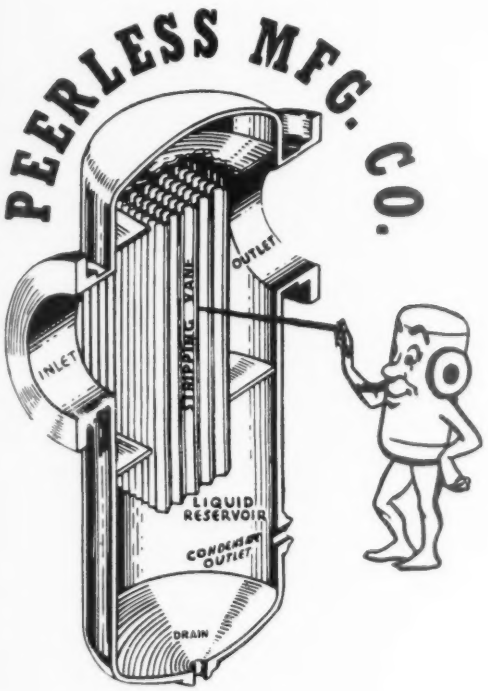

The drawing above shows the arrangement of the vanes in the Separator. The mist extractor combines the forces of impingement, centrifugal motion and surface tension to obtain its high efficiency. The path of the gas through the unit is constantly bending, causing semi-violent turbulence and rolling of the gas against the walls of the vane. Impingement and centrifugal force combine to contact the droplets with the vanes, where they coalesce, and surface tension causes them to adhere to the vane surface. Gravity and the impact of the gas stream then drive the droplets into the pockets, where they roll down the vanes and out of the gas stream.

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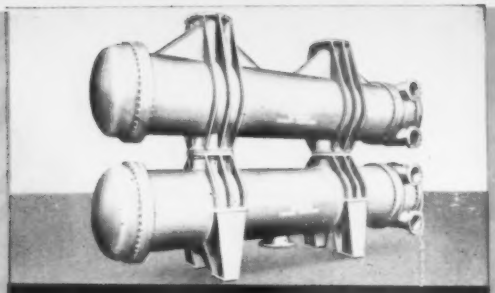

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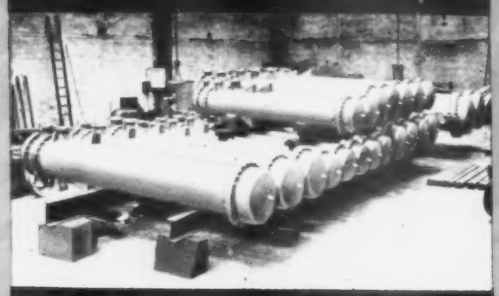

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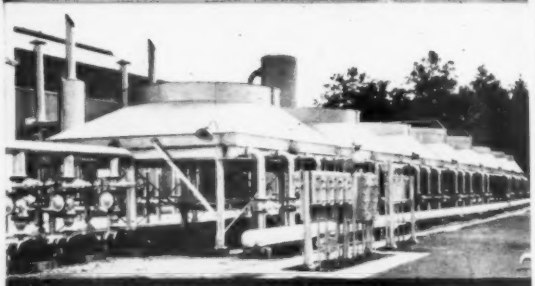
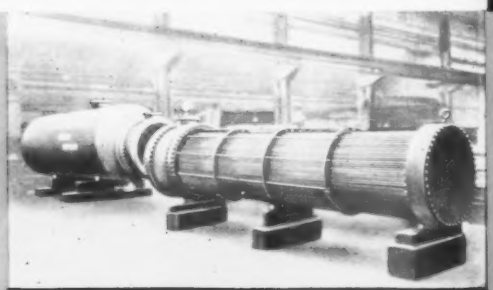


Craig-Hudson Solo-Air Exchangers -induced draught



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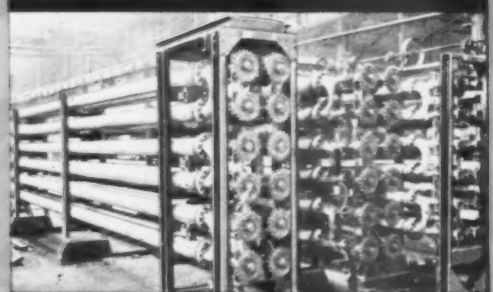

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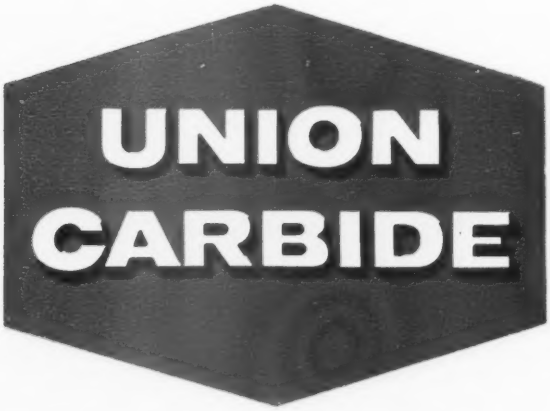

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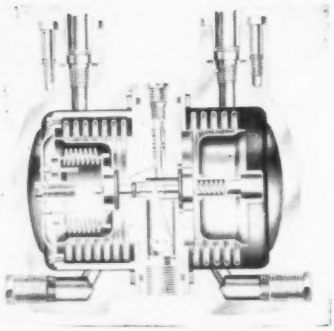

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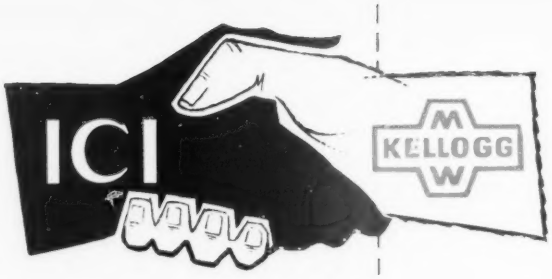
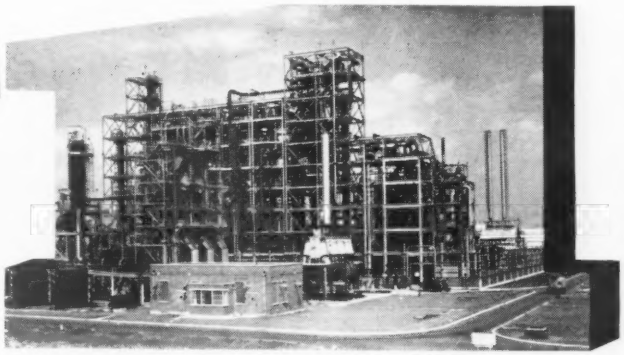


KELLOGG BUILDS FOR ICI EXPANSION

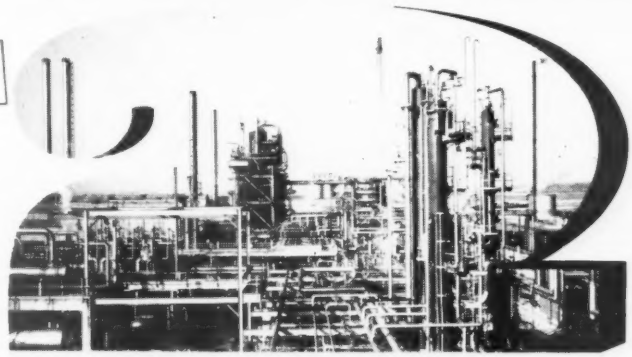
1951

The recent completion of the third olefine plant at Wilton has made these works the largest petroleum chemical venture outside the United States. With a current output of 110,000 tons per year of high-purity ethylene, and a potential output of 140,000 tons, ICI Wilton is a magnificent example of engineering co-operation.



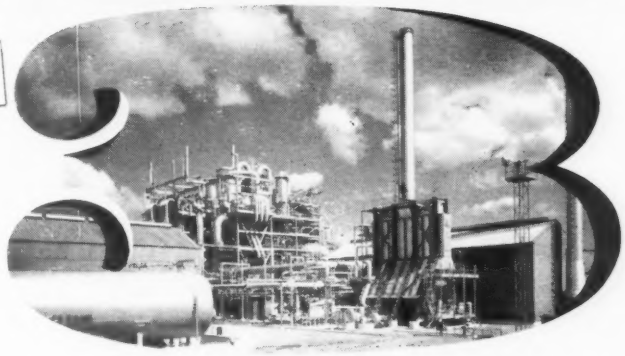
1956

The first plant was commissioned in 1951, and was the first full-scale adoption of the then novel process of oil pyrolosis developed in the Kellogg Laboratories. Its success led to the addition of No. 2 plant in 1956, and then to this latest extension, representing a 60% increase in olefine capacity, in 1959.



1959

Co-operation between client and contractor is the keynote of K.I.C.'s contribution to chemical engineering. The Wilton Olefine Plant is the largest in the world based on liquid feedstock: K.I.C. is proud to have been associated with its development



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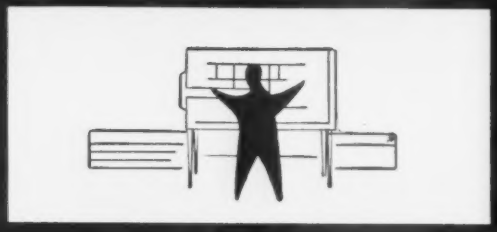
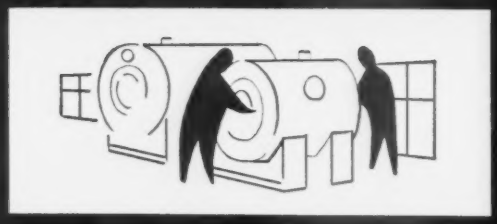


ENGINEERING. Fundamental process calculations, flow sheets, lay-outs, sizing of units, scale models, design and specification of equipment, piping, instruments, structures.



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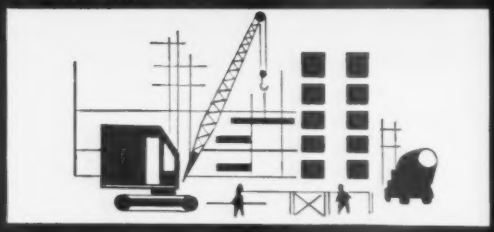
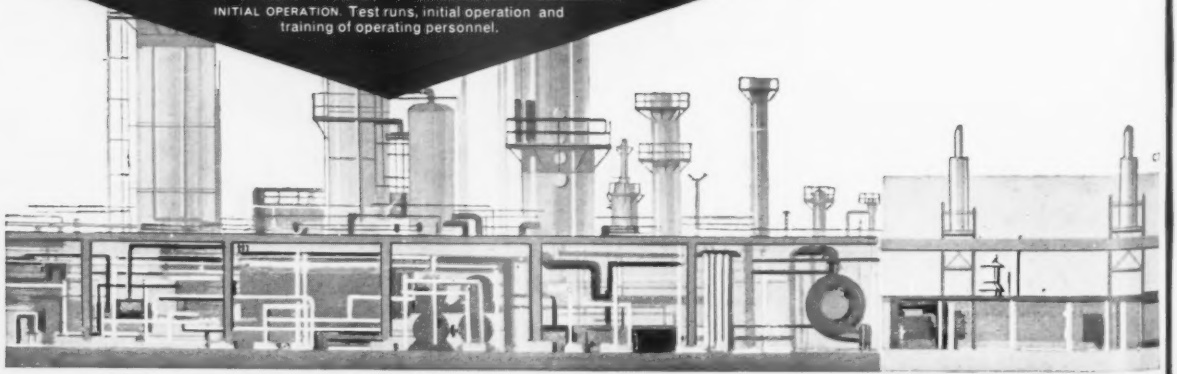
CONSTRUCTION. Site preparation, establishment of construction facilities, erection of buildings and structures, installation of equipment and accessories, fabrication and assembly of piping and electrical systems.



INITIAL OPERATION. Test runs, initial operation and training of operating personnel.



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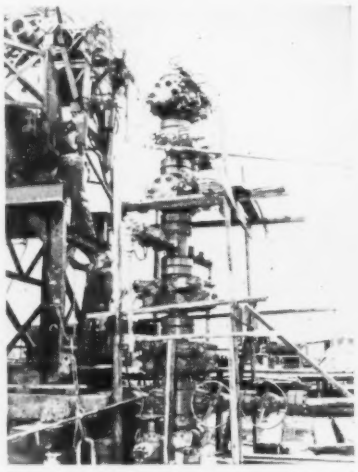
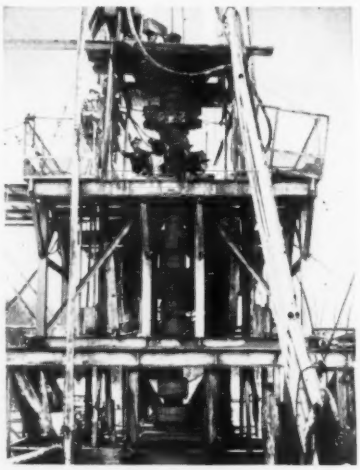


This stack of Cameron preventers helped regain control after a blowout occurred while coming out of the hole.



This well caught fire, after a casing failure, fortunately bridged and extinguished itself — once again under control it required extensive re-work before drilling could continue.

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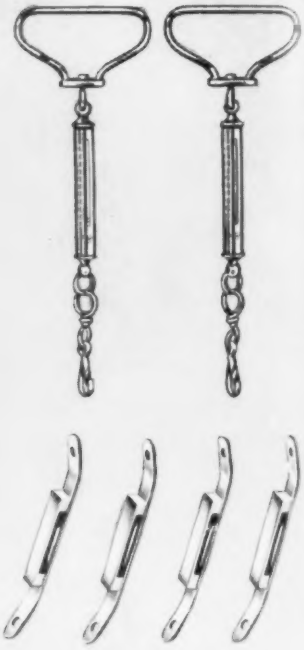

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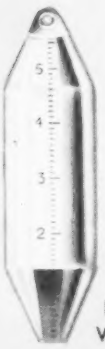

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WEIGHT
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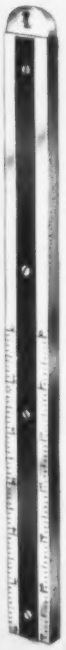

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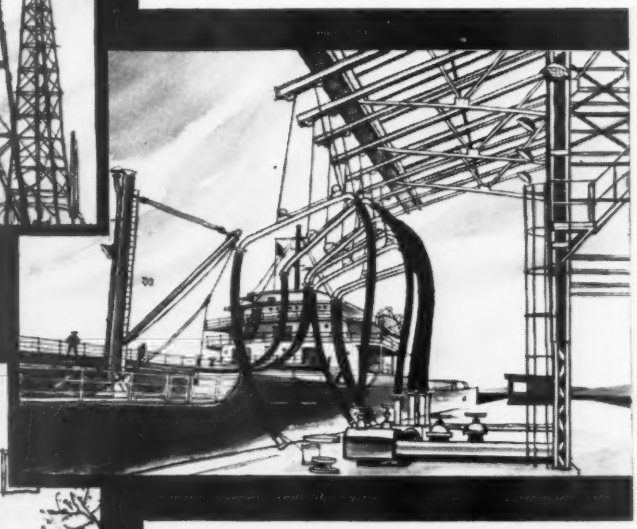

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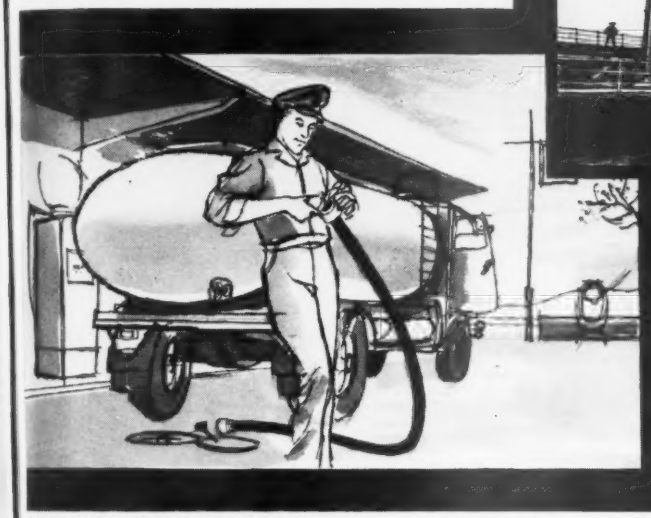

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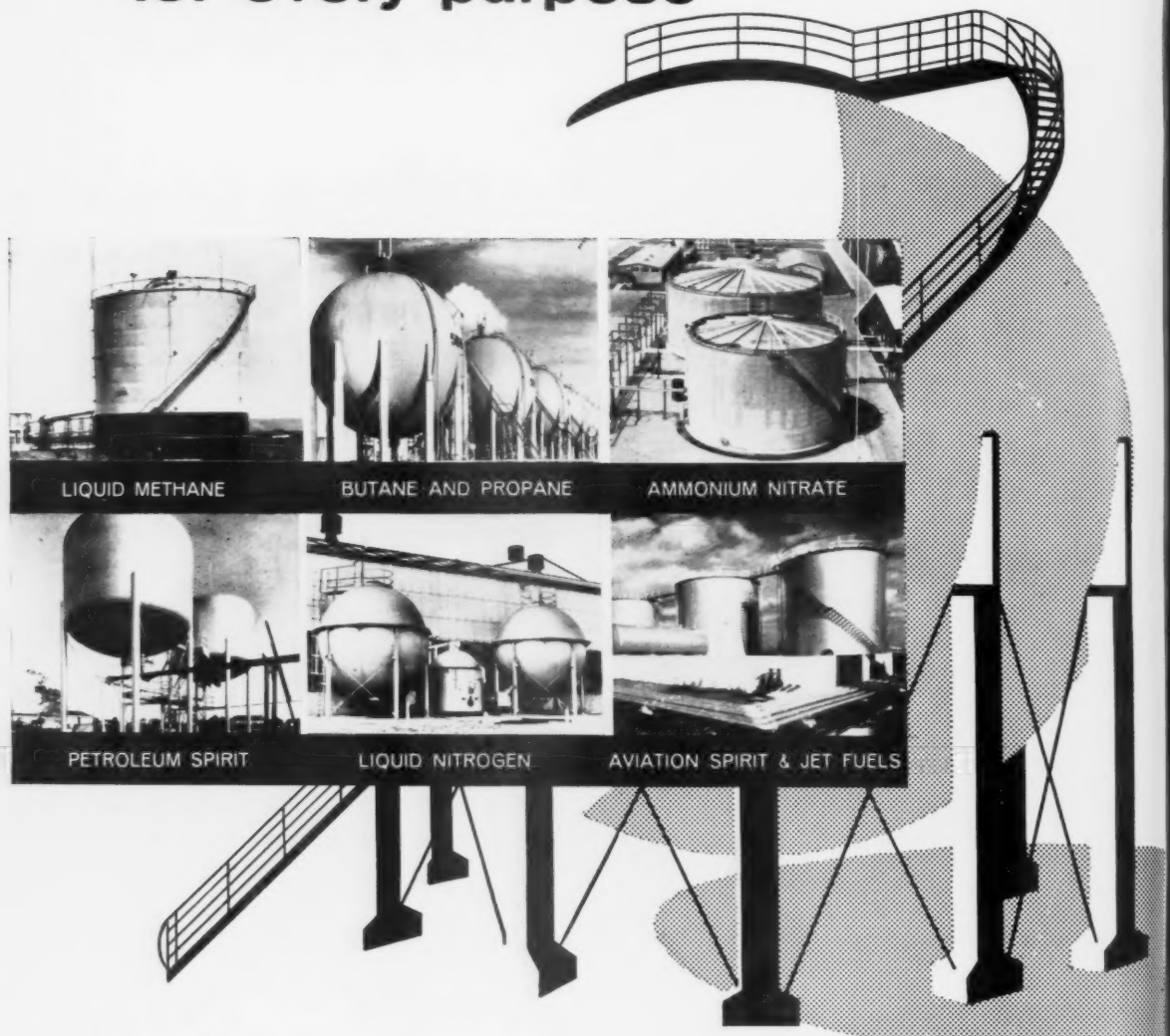

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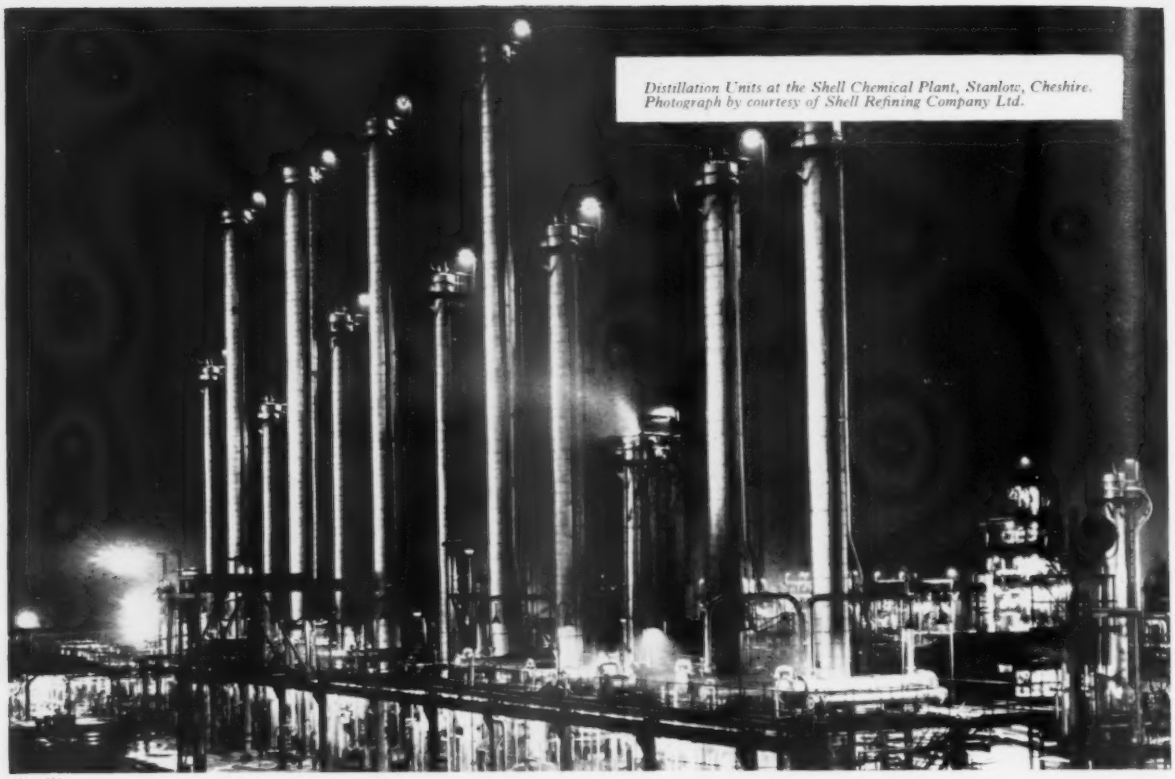

Distillation Units at the Shell Chemical Plant, Stanlow, Cheshire. Photograph by courtesy of Shell Refining Company Ltd.

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*Saharan and Libyan Oil**

By F. E. WELLINGS

It has been said of the Sahara that whenever a French politician visited Hassi Messaoud the reserves went up, but when a technician went they came down. During last summer's hot weather—politically as well as climatically—more technicians went there and the reserves were quoted as nearer 300 million tons than the 1000 million tons previously published.

No official estimates have as yet been given for Libyan reserves but they have been quoted in the technical press as being an estimated 200 million tons, of which half is claimed for the Oasis Oil Co. discoveries and half for Esso Libya. When the reserves of Hassi Messaoud (where 50 wells have been cored and tested) can vary so much in advance of performance data, it is obviously premature to put firm figures on Libya.

However, taking the drilled proved reserves of Hassi Messaoud at 300 or even 500 million tons, and of Edjele-Zarzaitine at 200 or even 300 million tons, making a total for the Sahara of 500–800 million tons, it is obvious that its potential cannot be compared with the Middle East reserves of 24,000 million tons, or even with Iraq's 3000 million tons, let alone the 7–8000 million tons reserves of Kuwait and Saudi Arabia.

The oil potentialities of the Middle East are well-known, and the subject has often been discussed. Although it is not within the scope of this paper to add to this discussion it may be of interest to mention discoveries made in the Middle East in the past year. These are few altogether, and are generally extensions of previous strikes and add only decimal percentages to the reserves.

Egypt—Two small fields, Ras Bakr and Kreim on either side of Ras Gharib discovered by the Government concern, General Petroleum.

Syria—After 7 dry holes, the German Concordia found a 700 bd well at Soudeiye, 10 miles south of Karatchok.

In spite of 30 and 40 wildcats respectively in *Turkey* and *Israel*, no new field has been discovered.

In *Iraq* Upper and Middle Cretaceous limestones were found productive under the Bai Hassan field, as under the Baba dome at Kirkuk.

Kuwait—A 10,000 bd well at Minagish was found.

Neutral Zone—The latest discovery is by the Japanese Arabian Oil Company, 6000 bd from 4900 ft, 26° API, 28 miles offshore in 100 ft of water. This is the fourth offshore strike in the Arabian Gulf. It is a marine seismic structure 40 miles north-east of Safaniya, and in the same lower Bahrain and Zubair sand pays. Its success has obligated the company to a £1 million payment and a relinquishment obligation in 3 years' time, so with more than one seismic structure their development programme is announced as 9 wells this year and an export of 2 million tons a year by 1961.

In *Saudi Arabia*, Aramco have a big new field in Kurais, near Riadh, in the D. limestone. Khursaniyah will soon be their sixth field to go on production.

In *Persia*, NIOC report a promising find at Sarajeh, south-east of Qum.

The Consortium has had Cretaceous strikes in Ahwaz No 6 and Binak No 1.

Off the *Trucial Coast* the Adma Umm Shaif No 3 has been reported at 5000 bd from the Lower Jurassic.

Murban No 3 is another well in the Lower Cretaceous Thamama which first showed oil in No 1, and is the upper productive zone at Umm Shaif. It is too soon to say what these two strikes are worth.

Altogether there are at present 10 exploratory rigs in and along the Gulf.

ALGERIA

Algeria is a country of 880,000 sq m, nearly as big as Saudi Arabia, and of this the Sahara comprises 90 per cent and Barbary 10 per cent.

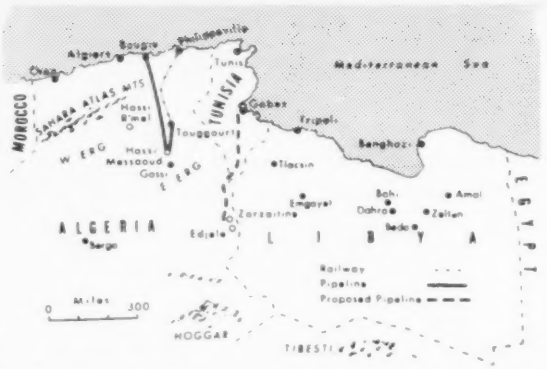
The main structural frame work of the country is as follows.

(1) The *Atlas mountain complex* exposing mainly Tertiary, Cretaceous, and Jurassic limestones and marls, which rest on basement—at Algiers and other outcrops. There are two ranges, the Coastal Atlas and the Sahara Atlas, both rising to 7 or 8000 ft, separated by the intermediate plateau of younger sediments up to 3000 ft high. Folds in the Sahara Atlas are asymmetric to the south and faulted.

(2) The *Sahara desert*, with some large dune areas, the East and West Ergs, covered with recent deposits.

* Presented to the Exploration and Production Group on 31 March 1960.

(3) The *Hoggar Mountains* of folded and faulted Palaeozoics lying south of an escarpment of transgressive Cenomanian, and forming an aureole belt in front of the basement. Folds trend north and north-north-east and can be traced by geophysics towards Hassi Messaoud.



Most of the country was covered by air photographs and the geological succession in the interior or Sahara Atlas established after the war, but it was not until 1952 that the Hoggar was examined by oil geologists. They confirmed the existence of thick Palaeozoic sediments on the west and south side of the desert, and although no seepages or other oil indications were found, the Sahara was considered to be a basin and it was thought to be worthwhile taking out permits and starting geophysical exploration.

The Devonian sandstone was fancied as a reservoir between Upper Devonian shales and Silurian source beds, but the Cambro-Ordovician arkoses were hardly considered.

Exploration

The area selected for geophysics had to be based on practical considerations of accessibility because out of the vast sedimentary area of 500,000 sq m (almost equal to that of the Middle East), nearly half was covered by huge impassable dune areas, the Western and Eastern Ergs.

The first prospective area narrowed itself to a traversible belt south of the Atlas, some 500 miles from north to south and up to 700 miles from east to west, twice the size of Iraq.

The Government Company SN REPAL and CFP(A) applied for the first permits south of the Atlas totalling 50,000 sq m, each with combined interest 51–49 per cent, in 1951; CREPS (35 per cent Shell) applied for 56,000 sq m in 1952 south-west and south-east on to Palaeozoic; and CPA (65 per cent Shell) took 64,000 sq m in between. All these were granted in 1953 with an expenditure obligation and 50 per cent relinquishment after 5 years, so already the discarded pieces have been taken by competitors, who now number 23 companies (including 6 foreign) holding 75 permits covering 250,000 sq m.

Algerian permits are limited in size to 50–60,000 sq m with 50 per cent relinquishment after five years, and a reduction to ¼ after five more years.

The first surveys were by means of geological air photos and gravity methods followed by seismic reflection, but nothing much came out of either except Edjele and the other Palaeozoic surface structures.

The first well by CREPS, Berga No 1, on a surface structure, got gas in the Devonian early in 1954.

The first wells drilled on geophysics were stratigraphic tests and these provided the surprise of a thick Mesozoic sequence, especially of Triassic evaporites and reservoir sands with a big unconformity over the Lower Palaeozoic sands. Besides providing cap rock, the presence of the unconformable Triassic evaporites explained why the air photos, and the gravity and reflection seismic surveys, did not reveal the buried structure shown later by refraction.

It is now said that magnetic surveys reveal the basement uplifts underneath the known Hassi Messaoud and Hassi R'Mel domes, more in accord with the seismic refraction profiles, so surveys of new permits are now being commenced with the aeromagnetic method.

Discoveries

The first oil discovery was in January 1956 by CREPS at Edjele: 500 bd of 37 API in Carboniferous at 1500 ft and Devonian at 2500 ft under a surface faulted anticline. This was closely followed by SN REPAL'S M.D.1 at Hassi Messaoud in July; 12,000 bd from Cambrian sandstones at 11,000 ft, based on refraction seismic profiles. CFP(A)'s well O.M.1 came in the following year, 1957, on the north side of the dividing permit line. The Hassi R'Mel gas field was also found by SN REPAL in 1956 in Triassic sands at 8000 feet. The latest oil strike was in 1959 at El Gassi by SNPA, also in the Cambrian on a permit discarded by SN REPAL. These last two were also refraction seismic. These Cambrian oils are light (45°) and sweet, and can be used directly in diesel engines.

The biggest field is Hassi Messaoud, and its first throughput in the new £40 million 24-in line which has a capacity of 5 million tons/year reached the terminal at Bougie, on the Algerian coast 400 miles away, on 20 November 1959, three years after discovery. Since June 1958 5000 bd had been produced and transported through a 6-in line to Toggourt rail-head and thence by tank wagon to Philippeville.

Hassi Messaoud is one of the world's giant oilfields, *i.e.* with more than 300 million tons of reserves proved by 50 wells. It is planned to reach a production of 9 million tons/year by April 1960, and the full capacity of the pipeline, 14 million tons/year in July 1961.

Edjele and its adjacent fields are individually smaller than Bai Hassan. CREPS 24-in pipeline to a terminal near Gabes, in Tunisia, 450 miles away will be finished about October 1960 with a 7 million tons/year capacity. Edjele now has 78 producers, and Zarzaitine, which is the most economically productive field, has 40, in several reservoirs.

Hassi R'Mel is one of the world's largest gas fields, and plans are being made to pipe its production to coastal towns and even under the Mediterranean to Sicily or Spain.

Therefore of the four original permit holders three have found oil, and only CPA in the south-west are unlucky with as yet only gas discovered to its credit.

It is being said—and it is superficially true—that the successful ones picked the easy areas between the dunes first and were lucky, for there have been no new discoveries besides El Gassi away from the known fields.

Hassi Messaoud wells are 11,000 ft deep, 400 miles from seaboard, so transportation costs alone represent 20 per cent of exploration expenditure. Its oil will carry an exploration charge of nearly 12 shillings a ton compared with an average of 4 shillings in the Middle East, but crude transportation charges to France, are some 30 shillings per ton less, so it thereby becomes competitive.

The total expenditure for exploration and some development given at the World Petroleum Congress last June was £300 million for the years 1946–57 inclusive, and is now

running at £100 million per year, £70 million for development and £30 million for exploration.

There are 45 rigs (25 development and 20 exploratory) and 25 seismic crews at present in operation, whilst some 4500 expatriates are employed in Sahara companies, not counting contractors' men.

Drilling and Production

Altogether 360 wells had been drilled to the end of 1959—of which 200 had been deep—and 220 were producers and 140 dry holes. This is a greater number of dry holes than were drilled in the Middle East (excluding Egypt) before the war, and more wells than have been drilled in Kuwait or Saudi Arabia to date. About 700,000 ft were drilled in 1958 and 1 million ft in 1959, which is more than in the entire Middle East in those years and amounts to nearly the total footage for Iraq to the end of 1958—a period of 30 years!

CFP(A) alone drilled 150,000 ft in 1959, using 6 strings (4 contractors) on development in Hassi Messaoud and 3 exploratory (2 contractors). The rigs in use by CFP(A) and their contractors are:—

EMSCO J.1400 with IDECO 143 ft masts
EMSCO A.800 with their 134 ft mast
IDECO Super 7.11 with their 143 ft mast
NATIONAL T32's for completions and workovers to 11,000 ft.

A wildcat is drilled to basement at 12,000 ft in 5 months, and a Hassi Messaoud 11,000 ft completion is now being done in 4 months. This compares with Basrah Petroleum's best of 70 days for a Rumaila producer to 10,500 ft.

There are, however, more drilling difficulties in the Sahara, especially with mud. Apart from the necessity of shutting off the 4000 ft Albian artesian water from the salt zone above, serious trouble is encountered at about 8500 ft with calcium chloride water shows at high pressure, which call for lots of special 137 lb mud before shutting off with the $9\frac{5}{8}$ in casing. The 7 in oil string is landed on top of the reservoir sands which are cored with oil-base mud. Wells are 2 miles apart on a diamond grid spacing, the crude is under-saturated and produced through 3 in tubing, which is fitted with storm-choke against sabotage.

There is an expensive central mud-mixing unit from which the four standard mixtures are hauled in tank wagons by a cementation contractor. Last year 20,000 tons of mud chemicals were used.

The Hassi Messaoud field is about 30 miles long by 20 miles wide, bisected on an east–west line between CFP(A) in the north and SN REPAL in the south who have an equal interest, holding an alternate 51–49 per cent share on each half. The structure is a gentle dome trending north-north-east to south-south-west, and the reservoir is Cambrian sandstones overlain unconformably by Triassic sandstones and evaporites. It has now been found that there are two culminations, separated by a fault zone. The top of the reservoir is a hard Cambrian quartzite overlying the upper and most porous sandstone pay which is up to 300 ft thick on the flanks, but in crestal wells some or all of these are removed by erosion. Underneath come more unproductive quartzite sandstones and arkoses, 1000 ft thick, which rest on basement granites.

While porosities of the main pay are fairly uniform at 15–20 per cent, it is the permeability which varies, and there is also some fracturing—noted in cores and mud losses—which cause the different productivities of wells from 5000–12,000 bd with low B.H.P.D.

As always, the question of the origin of the oil is intriguing. It is certainly stored in the Cambrian now, but this is unfossiliferous and non-marine continental. It could have migrated from fossiliferous Silurian or Devonian shales overlying farther into the basin, but the Cambrian sandstones were subject to prolonged uplift and erosion in Upper Palaeozoic and Lower Mesozoic periods, and any oil would have been dissipated. Isopachs of the basal Triassic show that the dome was being uplifted during its deposition so the alternative explanation now is that the reservoir was charged with oil from the unconformable overlapping Triassic shale at Hassi Messaoud and with gas at Hassi R'Mel.

At Edjele, where the Carboniferous shale is overlapping, it could have been the source formation for the oil.

Hassi Messaoud Camp

The CFP(A) Hassi Messaoud camp, called Maison Verte, presumably because of its verdure in the middle of a brown desert, is unlike any corresponding camps in the Middle East. It consists of skid-mounted pre-fabricated Dallas-type huts, and Supalite-type messes, kiosk-like bars, a concrete cinema—all these are air conditioned—a swimming pool, and 2 tennis courts. There are about 350 Frenchmen from France and Algeria and 150 Moslems in camp, while some 350 of the labour force are housed and fed outside. On top of this are 700 contractors' personnel outside the camp. The staff work 3 weeks on and have one week off with their families in Algiers or France.

Altogether there are 5000 men, French and Algerian, living out in the desert at Hassi Messaoud.

The pipeline and pump stations are built, owned, and operated by a third joint company called SOPEG. The line is buried throughout and has to pump over the Atlas Mountains at 3000 ft from the second pump station at 1500 ft. The field's elevation is only 300 ft.

As the field was so remote and time was important, CFP(A) had to plan ahead and standardize — perhaps more than was justified—in pre-fabricating wellhead, production, and pipeline installations so that snags developed when the field was put on production to fill the line.

The petroleum engineering laboratory equipment is some of the very best to found in any oilfield. Each wildcat has a petroleum engineer for mud as well as a resident geologist, each with his office laboratory caravan.

A wildcat camp in the Sahara. Note the double row of barbed wire and sandbags

CFP(A) Maison Verte Camp. The two-stage degassing and mud-mixing centre is in the background. A swimming pool can be seen in the foreground

LIBYA

Petroleum Law

The Kingdom of Libya comprises some 700,000 sq m, or more than four times the size of Iraq, and has a population of only 1¼ million.

A short Mining Law to authorize the granting of exploration permits was passed in September 1953 pending the enactment of the Petroleum Law in 1955. In drafting this the Petroleum Commission was helped by a panel of interested oil companies.

The country was divided into four zones:—

Zone I. Tripolitania in the north-west.
Zone II. Northern Cyrenaica in the north-east.
Zone III. Southern Cyrenaica in the south-east.
Zone IV. The Fezzan in the south-west.

There are two stages of permit holdings: a reconnaissance permit for one year, which is renewable; and a concession for fifty years, with a possible extension of ten years.

The maximum holding by any one company is 30,000 sq km in the northern Zones I and II, and 80,000 sq km in the southern Zones III and IV. The holder must relinquish 25 per cent after 5 years, another 25 per cent after a further 3 years, and 2 years later—in 10 years from the original grant—he must reduce to 33⅓ per cent of his area in Zones I and II, with the minimum size of 3000 sq km. In Zones III and IV he must reduce to 25 per cent after 10 years with a minimum size of 5000 sq km.

These concession terms are very different from those operating in the Middle East countries, where the old concessions are long term, 60–75 years, with no relinquishment except ARAMCO's 7½ per cent every five years and the Consortium's 20 per cent after 25 years.

Rentals are low for 15 years, or until commercial discovery—whichever comes first—and then become £25 per sq km. A minimum royalty of 12 per cent is imposed on production and a 50 50 division of profits.

Exploration must begin in 8 months and there are specified expenditures as working obligations. In addition there is a 25 per cent depletion allowance to be spent on further exploration.

By the end of the first year, December 1955, 47 concessions totalling 460,000 sq km had been granted to nine different foreign companies, subject to 25 per cent relinquishment by the end of this year. By the end of 1958, after 3 years, 55 per cent of the land area had been granted to 14 companies; now there are 84 concessions among 17 companies, all foreign.

Exploration

The Libyan desert consists of hard pan and sabkha along the coast, and stony desert or plateau (hamada) of flat Miocene limestones interspersed with dunes inland.

The big exploration handicap, however, is not sand or security but millions of mines left over from the war. To date there have been more party months devoted to mine clearance than to geophysics.

During the first 3 years of exploration, 1954–56, the greater part of the country had been covered by geological aerial photographs, and aerial magnetometer and gravity surveys. Generally speaking, gravity gives reliable leads in Tertiary and magnetic on Palaeozoic. Seismic activity has steadily increased since mid-1956 to 42 crews, but this is likely to fall off after the first relinquishments. Oasis Oil Co. has the most crews, 11, but BP has 7.

The first wildcat, a dry hole, was spudded in on 30 April 1956, by Libyan-American Oil Co., an American independent. Shows of gas and of oil were struck in water wells and the first discovery was in December 1957, by Esso in Atshan No 2. This was 500 bd of 45° oil in Devonian sandstone at 2000 ft, below a surface anticline exposing Carboniferous about 100 km south-east of Edjele, the French Sahara's discovery well of January 1956. The next discovery was by Oasis in the summer of 1958, at Dahi in the Sirte desert of Cyrenaica. This, a 700 bd find from Upper Cretaceous limestone at 5800 ft, was followed in December by a better one at Dahra—1000 bd from Palaeocene limestones at 3800 ft, at 38° API. These were on seismic structures and the cap-rock was Palaeocene shale.

The first big well was found by Esso at Zelten No 1 in June 1959, at 17,500 bd from Palaeocene shelly limestones at 5500 ft. This was quickly followed by 15,000 bd at No 2, also 38°API. These wells were located on seismic profiles across a broad gentle surface anticline in Miocene limestone. Nos. 3, 4, and 5 are smaller producers.

Zelten is 200 miles south of Benghazi and 100 miles from the coast, and already surveys are in progress for a pipeline and terminal. A £1½ million order for 30 in pipe has been placed. Also in this area are the lesser strikes of Caltex at Beda (3650 bd in Upper Cretaceous), Libyan-American at Mabruk (2500 bd in Palaeocene), and, more recently, Mobil at Amal in the Palaeozoic. Other discoveries in the west are Shell's Tlacsin and Gulf's Embayet, both in Silurian, and a recent one by Oasis.

Now 75 wells have been drilled with a total footage of around 400,000 ft (compared with 360 wells in the French Sahara), of which 14 have struck oil—a success ratio of 1 in 6 wildcats, which is very good. There are now 25 rigs operating, half being on contract; Oasis has the most, 11 rigs, and has drilled 14 wells on its Sirte concession including further producers. Esso has drilled 8 on its Zelten one and 12 around Atshan which, though 12 miles long, proved non-commercial.

Total expenditure to end-1959 was £80 million, which is more than has been spent by non-producing companies in the Arabian Gulf and south-east Arabia.

Concessionary and exploratory activity have reached the Egyptian frontier, where the Sahara Oil Co. gave up their

75,000 sq m concession a year ago after drilling 9 dry holes totalling 100,000 ft and spending $40 million in 4 years.

Geology

Apart from the Palaeozoic structures around Atshan in the Mediterranean coastal belt there is not much surface geology to be done in Libya, and the structural framework is not so apparent as in Algeria.

Behind Tripoli is a fault scarp with a throw to the north estimated at 1000 ft, and cut back by erosion to expose the Jurassic and Triassic. Jebel Akhdar, east of Benghazi, is another broad gentle uplift.

There is one interior fold axis, 100 miles long, exposing basement and Nubian sandstone, trending east-north-east to west-south-west crossing the 28° parallel between Tripolitania and Fezzan. It separates the Toggourt and Murzuck basins.

In the south are the Tibesti Mountains, also exposing basement and Palaeozoic Nubian sandstone, with a spur running north-north-east which separates the Murzuck basin to the west from the Kufra one on the border with Egypt.

The best defined basin is that of Sirte, north to south, in which the Tedma well penetrated 11,000 ft of Tertiary before entering the Cretaceous. There are also several other deep dry holes. Along its flanks occur the Zelten field in Palaeocene shell breccias, the Caltex Beda and the Oasis wells in Upper Cretaceous and Palaeocene limestones. The Zelten structure is said to be 25 miles long and the Oasis one even longer.

The Palaeozoic seas covered most of the country and retreated in Carboniferous times, leaving continental Nubian in the south and a major unconformity with the overlapping Mesozoic as in the French Sahara. The Triassic is non-marine at Atshan, but marine behind Tripoli; the Jurassic has evaporites.

Around the Sirte basin, wells go into Palaeozoic sands below Cretaceous and below this basement. One well found oil in granite! There are some Tertiary lava flows and some igneous sills have also been penetrated in Cambrian. The Silurian is determined by graptolites, and the Ordovician by worm tracks and spores.

Geologists in Libya agree with those in Algeria that the Fezzan oil is probably indigenous to the Carboniferous and Devonian in which it is found, but they consider that the oil found in the Sirte basin in Palaeocene, Upper Cretaceous, and even Palaeozoic there is indigenous to the Palaeocene. This oil is of different type from the Sahara, heavier and more sulphurous.

The occurrence of oil in different formations just above and just below the unconformity suggests its function as a carrier plane.

The regional geology under this major unconformity is not as simple as has been outlined however. Every deep test calls for a fresh review interpretation of seismic and subsurface evidence. There is some confusion between Palaeocene and Upper Cretaceous limestones, and also between Triassic and Jurassic evaporites, due to the lack of good geological markers. Trade and exchange of photographic and gravity coverage is general, but not of subsurface data.

The presence of evaporites overlapping Palaeozoic reservoirs in the west calls for refraction seismic as in the French Sahara.

There are thus major differences in geology between North Africa and the Middle East oil provinces.

The oldest producing formations in the Middle East are Palaeozoic Nubian sandstone in the small Gulf of Suez fields, and Triassic limestones at the small producer Butmah 2. Jurassic limestones hold the huge reserves of Saudi Arabia and those of Qatar. The big production of Kuwait and Basrah, and also the Wafra and Safaniya oil, comes from Middle and Lower Cretaceous sandstones. Cretaceous limestones are productive in Karatchok, Ain Zalah, Kirkuk, Wafra, Manifa, Bahrain, Umm Shaif, and Murban. The big fields in northern Iraq and southern Persia are Tertiary limestones.

It has been estimated that Middle East reserves are fairly equally divided between Tertiary, Cretaceous, and Jurassic.

In the Sahara, the main oil reserves are in Palaeozoic sandstones; in Libya, so far, they are in the overlying Upper Cretaceous and Tertiary limestones. In both countries wells go from Tertiary to basement in 12,000 ft, so there is nothing akin to the thickness and volume of sediments in the Middle East.

Folding in northern Iraq and southern Persia, being geologically a late event, is revealed by long north-west to south-east surface anticlines with seepages.

On the desert side in Basrah and Kuwait the oilfields show up on gravity and seismic maps as north to south, while in Saudi Arabia structure drilling and gravity have delineated long north-south folds which are parallel to the surface axes of Bahrain and Dukhan.

The Palaeozoic surface folds of the southern Sahara and southern Libya also strike north to south, but in the Sahara the overlapping Mesozoic with its dense and high velocity evaporites obscure the buried Palaeozoic structures except by refraction seismic and magnetic..

In Cyrenaica the trend of the productive structures in the Oasis and Esso concessions is north-west to south-east, which is at variance with the east-north-east trend of the Atlas Mountains and of the interior structures.

Marsa Bregha Bay, Cyrenaica, Gulf of Sirte

Drilling Methods

The majority of rigs are not unitized and mobile, but the Ideco Desert Star and Mid-Continent's U.36, introduced into Libya respectively by Camdrill and Loffland drilling contractors, are well-known exceptions to this. Companies and contractors have transferred the rigs they own from elsewhere. Loffland has a National 130 drilling for Esso, and BP has moved their 130 in from Malta.

Loffland's U.36 rig moves on five trailers with huge sand tyres 2100 · 25. The roles of the various trailers are one

each for subsurface equipment; drawworks; mast; pumps; and utilities, *viz.* engines and generator sets.

A 5–6000 ft completion is done in 2 months for about £200,000. An 11,000 ft wildcat takes 5 months, and may cost £400,000.

The Desert Star also has five semi-trailers on 2100 · 25 sand tyres.

The deepest well to date is Shell's Tlacsin, 13,187 ft, and costing £1 million because it took months to grind away the last 3000 ft of hard quartzite and igneous to basement.

The prevailing difficulty in Libyan drilling is lost circulation, without having the better water supply of the Sahara.

Drilling contracts are in essence labour contracts without incentives, the company supplying everything except messing, accommodation, and personnel.

A typical drilling camp comprises 20 expatriates and 40–50 Libyans in 26 Elder air-conditioned caravans, including 6 sleepers—8 in each—for labour plus one diner and one kitchen, and 12 sleepers for the drilling superintendent, toolpusher, and 10 American and 8 other expatriates (2 in each). Stores and commissariat are usually in tents.

All pays and oil shows are cored at regular intervals for stratigraphic information. There are contract Schlumberger and Halliburton cementation trucks at each location, the operators being flown back and forth.

The resident geologist's laboratory and office trailer has fitted bench, sink, core rack, etc., but also includes mud engineering facilities, for the resident geologist is also the mud engineer, and works without a local helper. There is no local sample washer, slide grinder, or fossil picker.

A typical seismic crew has 15 staff, including 10 Americans. The camp comprises 15 caravans, including 10 sleepers. The labour may be accommodated in a separate tent camp and fed by contract. The party cost £20,000 per month and crew work 4 weeks and take one week off. Their best production rate is 350 km/month, and it has been said that seismic work is generally faster in Libya than in Iraq.

All companies and contractors depend on charter aircraft. Sabena has 9 Dakotas, Silver City has Bristol Freighters, and World Wide has D. H. Beavers and helicopters for hire.

Landings are made almost everywhere without the aid of a prepared strip by Beavers.

Personal Notes

Monroe Jackson Rathbone, president of Standard Oil Company (New Jersey), has been named chief executive officer and chairman of the executive committee. He retains the presidency, a post he has held since 1954, and succeeds as chief executive officer **Eugene Holman,** board chairman, who has reached retirement age. Succeeding Mr Holman as chairman of the board of directors is **Leo D. Welch,** an executive vice-president, who joined Jersey as treasurer in 1944. He will also be vice-chairman of the executive committee. **M. A. Wright,** a director since 1958, was elected an executive vice-president and a member of the executive committee.

A leading figure in the international oil business for more than a quarter of a century, Mr Holman began his petroleum career as a geologist in 1919. After rising to a number of executive posts in Jersey-affiliated companies in the U.S.A. and overseas, he was named a Jersey director in 1940. Two years later he was elected a vice-president, and in 1944 was made president. He became board chairman in 1954.

Mr Rathbone, a chemical engineering graduate of Lehigh University, began his career as a draughtsman in the Baton Rouge refinery. In 1936 he became president of Standard Oil Company of Louisiana, later merged into Esso Standard Oil Company, of which he was also president. He was elected to the Jersey Board in 1949, and was named president five years later. He is also chairman of the American Petroleum Institute.

Mr Welch began his business career with the National City Bank of New York shortly after his graduation from the University of Rochester in 1919. After serving in various parts of South America he was appointed vice-president in charge of First National's operations in the Caribbean area. Coming to SONJ as treasurer in 1944, he was elected a director in 1953, vice-president in 1956, and an executive vice-president and member of the executive committee in 1958.

Mr Wright began his oil career in 1933 as an oilfield roustabout in Oklahoma with a Jersey Standard affiliate, after graduating from Oklahoma State University as a civil engineer. After serving in various engineering positions in Oklahoma and Louisiana, he came to Jersey's New York offices in 1946, and three years later was named deputy co-ordinator of the producing department. In 1951 he was elected executive vice-president of International Petroleum Company Ltd, a Jersey affiliate with operations in Colombia and Peru, and an executive vice-president of the Carter Oil Company in 1952. He was appointed head of all Jersey's producing activities two years later, and was elected a director in 1958.

John Linton Black, B.A., F.Inst.Pet., has been appointed general manager of the Shell Haven refinery in succession to **James Grant,** A.R.I.C., F.Inst.Pet., who retired on 30 April.

Mr Black was educated at Trinity College, Glenalmond, and Oxford University. He started his career with Shell in 1935 at the Central Laboratories in Fulham, and was then assigned as a technologist to Shell Haven refinery in 1936, moving to Miri (Sarawak) in 1938, and subsequently, in 1939, to Pernis refinery.

After a short period in the U.S.A. in 1939 he returned to the U.K. and was assigned to Heysham refinery as a technologist, in 1940. In 1943 he moved to Stanlow refinery, becoming refinery superintendent in the following year.

Mr Black was made assistant refinery manager at Shell Haven in 1948, and in 1950 manager administration/services and deputy to the general manager at Stanlow refinery. In April 1959, he was given a special assignment at Shell Refining Company's head office as staff manager and deputy to the personal director.

Mr Grant, who was also a director of Shell Refining Company Ltd, retired after more than 32 years' service.

Educated at George Heriot's School and the Heriot-Watt College, he joined Shell in 1927 after previous service in Persia. He spent the next 10 years at refineries in the U.S.A. Early in 1938 he was made assistant refinery manager at the

Suez refinery of Anglo-Egyptian Oilfields Ltd, and returned to the U.K. in 1941 for a temporary assignment in connexion with projected refinery developments at Thornton Research Centre and Heysham. Towards the end of 1941 he was appointed refinery superintendent at Stanlow, a post he held until he left in 1944 for Trinidad to become assistant manager, and subsequently (in 1946) refinery manager, at the Point Fortin refinery of United British Oilfields of Trinidad.

In October 1948 Mr Grant returned to the U.K. as assistant refinery manager at Stanlow, and was appointed refinery manager at Shell Haven in 1951, becoming a director of "Shell" Refining and Marketing Company in 1955.

The Arabian American Oil Company announces that **Garry Owen,** a vice-president, has been elected a director of the corporation.

Mr Owen has been with Aramco since 1941. He graduated from the University of California at Berkeley with an A.B. degree, and received his LL. B. degree from Harvard Law School. Prior to joining Aramco he practised law for 12 years, and joined Standard Oil Company of California in 1939.

He is now stationed in Washington, D.C., where he is in charge of government relations affairs for Aramco in the United States.

Captain Roland George Mott has been appointed commodore of the BP Tanker Company in succession to **Commodore H. I. McMichael,** who has now retired.

Captain Mott began his sea-going career in 1916 as a navigating apprentice in sailing ships with James A. Shute, of Liverpool. He joined the BP Tanker Company as a junior officer in 1924, was promoted master in 1933, and became one of the Company's senior post masters in 1954. Captain Mott was appointed an O.B.E. in the 1958 New Year Honours List. He has served in command of supertankers since 1953, and has just been appointed to command the Company's latest supertanker, *ss British Queen*, of 50,000 dwt.

Commodore McMichael has been commodore of the fleet since 1958. He commenced his sea-going career as a navigating apprentice with James Gardiner & Company and joined the BP Tanker Company as a junior officer in 1920. He was promoted master in 1932 and senior post master in 1952. He was awarded the O.B.E. in the 1954 Birthday Honours.

C. Stribling Snodgrass, F.Inst.Pet., of Snodgrass Associates, Washington, D.C., has transferred his headquarters to 65 Grosvenor Street, London, W.1., where he continues the practice of consulting engineering, specializing in the processing, transportation, and utilization of oil and gas.

Prior to the second world war he was managing director of Snodgrass, Perrin & Co. Ltd, a technical advisory organization, of London. Most recently, Snodgrass Associates have completed studies on the utilization of gas from the Nahorkatiya field in north-eastern Assam, and on extensions to the Sui gas pipeline into the northern areas of west Pakistan.

C. J. Hampton, has been appointed regional manager of South-East Region, of Petrofina (Gt Britain) Ltd.

Mr Hampton joined the Company nine years ago, in what was then Eastern Division, at Ipswich. When the Division became part of Midland Region, he subsequently became, in 1954, a district manager, and, in 1957, assistant regional manager, South-West Region.

Norman Harrison has been appointed chief marine engineer of Wakefield-Dick Industrial Oils Ltd. He was educated at South Shields Marine College, and went to sea in 1944 with the Furness Prince Line, rising to the rank of third engineer. He subsequently joined the Hain Steamship Company, eventually attaining the position of chief engineer.

In 1955, Mr Harrison joined Wakefield-Dick as a technical sales representative, and was transferred to the Company's head office in 1957 to take charge of the Technical Department of the Marine Division.

N. Harrison

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HONORARY K.B.E. FOR J. H. LOUDON

Photo by Douglas Glass

J. H. Loudon

We are happy to record that H.M. The Queen has been pleased to appoint Jonkheer J. H. Loudon to be an Honorary Knight Commander of the Most Excellent Order of the British Empire, Civil Division, in recognition of his important contributions to the national economy and to British interests abroad.

Jonkheer Loudon is president of the Royal Dutch Petroleum Company and a senior managing director of the Royal Dutch/Shell Group.

HER MAJESTY'S BIRTHDAY HONOURS

Appointments made by Her Majesty on the occasion of her birthday include:

KNIGHT BACHELOR

Percy Llewellyn Hunting, chairman, Hunting Group of Companies.

Gordon Brims Black McIvor Sutherland, director, National Physical Laboratory.

C.M.G.

Arthur Franklyn Williams, Assistant Secretary, Ministry of Power.

C.B.E.

Ernest John Hunter, chairman, Swan, Hunter, and Wigham Richardson Ltd.

O.B.E.

Alick Ernest Mason, formerly managing director BP Refinery (Kwinana) Ltd and director of BP Australia Ltd.

Godfrey Theaker, secretary, John I. Jacobs & Co. Ltd, for services to trade in the Island of St Helena.

Ferdinand Bernard Thole, lately Senior Principal Scientific Officer, Ministry of Power.

M.B.E.

Robert George Protheroe, manager, Purfleet terminal, Esso Petroleum Co. Ltd.

IP Council and Officers 1960-61

J. M. Leonard, the new President of the Institute

At the Institute's Annual General Meeting on 11 May, Julian M. Leonard was unanimously elected as President for the session 1960–61.

Julian M. Leonard is managing director and deputy chairman of Carless, Capel & Leonard Ltd and his active association with the petroleum industry began in 1917 when he entered that firm as a junior chemist. Continuing his studies at London University for a further five or six years he was made a partner in the firm in 1926, when he was given responsibility for the running of the various works, including the design, erection, maintenance, and staffing of all the plant and buildings. His work took him into the development of petroleum and coal-tar naphtha refining plant and covered extensive experiments on fractional distillation columns and stills, both in the laboratory and on a practical scale. When Carless, Capel & Leonard was converted into a private limited company on 1 January 1949 he became managing director and deputy chairman.

It could be said that, resulting from his early experience, Mr Leonard's interests have had a bias towards chemical engineering. He has been a member of the Institution of Chemical Engineers for nearly 25 years, and is a past vice-president and member of Council. He has always shown a great interest in the chemical side of petroleum and coal-tar refining, and, in 1921, he joined the Society of Chemical Industry, in which he has always taken an active and prominent part. He held the position of honorary secretary of the Chemical Engineering Group of the Society of Chemical Industry for 8 years and was chairman of the Group from 1947 to 1949. He was honorary treasurer to the Society of Chemical Industry from 1946 to 1955, when he was appointed the Society's President for the years 1955–6 and 1956–7.

As well as being a Fellow of our own Institute, he is a member of many other learned societies and institutions, as well as being a Liveryman of the Worshipful Company of Apothecaries and of the Worshipful Company of Farmers.

MEMBERS OF COUNCIL

As the result of a ballot of members, three new members were declared elected, as follows:—

T. F. Gaskell, M.A., Ph.D., F.R.A.S.
W. E. Madden, A.R.S.M.
W. H. Thomas, A.R.S.M. F.R.I.C.

Dr T. F. Gaskell

Dr T. F. Gaskell, who is a research associate in the Exploration Department of The British Petroleum Company, is also a well-known broadcaster on science matters. He studied physics at Cambridge University, where he graduated in 1937, and gained his Ph.D. degree after studying geophysics at Cambridge under Sir Edward Bullard, F.R.S. His thesis was written on the application of seismic refraction work to the study of detailed geological problems, and on early refraction measurements at sea on the structure of the continental shelf. After war service with the Admiralty on all aspects of underwater weapons he joined The British Petroleum Company and served for three years as chief petroleum physicist in the Persian oilfields. A three-year leave of absence was granted for Dr Gaskell to lead the world-wide oceanographic expedition of *H.M.S. Challenger*, during which seismic measurements were made in the deep oceans of the world. An interesting account of some of the work and findings of that expedition are the subject of a newly-published book by him.

W. E. Madden

W. E. Madden, who has been a member of the Institute since 1925, joined the Shell Group in 1927 and, after a few months' training as a roughneck on a drilling rig in Roumania, proceeded to Mexico as junior geologist. He remained in Mexico with the Mexican Eagle Oil Company until the expropriation in 1938, finishing up as Isthmus Area general manager. He then served in Venezuela with the Caribbean Petroleum Company (now Compania Shell de Venezuela Ltd) until 1947, for seven years as assistant general manager in Maracaibo and for two years as assistant general manager in charge of operations in Caracas. After one year in The Hague and U.S.A. he was general manager of United British Oilfields of Trinidad (now Shell Trinidad Ltd) until 1952, when he became manager of Purchasing Division of Shell Petroleum Co. Ltd in London. From 1954 to 1960 he was manager of Shell Group Materials

Services, London, and was recently appointed manager, Personnel & Services, London, for Shell International Petroleum Co. Ltd.

His other activities include: chairman of Council of the Oil Companies Materials Association; member of Council of Engineering Equipment Users Association; member of Petroleum Equipment Industry Standards Committee and Engineering Divisional Council of the B.S.I.

W. H. Thomas, forty years a member of the Institute, is no newcomer to its Council, having previously served as a member from 1952–9. Graduating from the Imperial College in 1923, he was one of the earliest recruits to the BP (then Anglo-Persian) research centre at Sunbury. In 1936 he went to Abadan for plant development work and in 1941 he returned to Sunbury where three years later he commenced the organization of an analytical section designed to embrace not only analytical services but analytical research also. This task culminated in the commissioning in 1958 of the new analytical and physics laboratory described in our columns in July 1958.

W. H. Thomas

At the end of last year, W. H. Thomas retired from BP and is now with the Ministry of Power as technical adviser on petroleum matters.

In his early days at Sunbury, he came under the influence and enthusiasm of Dr A. E. Dunstan, twenty-five years IP honorary editor. It is therefore not surprising that he has long been interested in Institute affairs. Publication matters first claimed his attention and he has many years membership of the Publications Committee to his credit. Standardization of testing methods has also been one of his special interests and, as chairman of the Standardization Committee, he will continue to play a leading role in this sphere.

Ex Officio Member

As an *ex officio* member of Council representing the branches, **H. Kaye** was elected for the period 1960–62. Mr Kaye is well known to the members of the Institute resident in the Northern Branch area as he has been honorary secretary of that branch since 1955. Educated at Manchester Grammar School and Manchester University, he took a B.Sc.(Tech) degree in chemical engineering. In 1938 he joined the Manchester Oil Refinery Ltd as process engineer and six years later was made chief engineer in charge of the Edeleanu plant responsible for its operation, maintenance, and development. In 1946 he was promoted assistant refinery superintendent and in 1948 became process superintendent responsible for all the company's process plants and for the production of all products. He is now a director of the Company. In 1954 he became an associate member of the Institution of Chemical Engineers and in 1949 was elected a member of the Institute.

H. Kaye

MIDDLE EAST OIL PRODUCTION

	April	*Jan.-April*
	Tons	
Iraq Petroleum Co. Ltd ...	2,505,884	10,146,268
Basrah Petroleum Co. Ltd ...	1,045,967	4,116,540
Mosul Petroleum Co. Ltd ...	104,385	425,848
Qatar Petroleum Co. Ltd ...	652,834	2,759,483
Iraanse Aardolie Exploratie en Productie Mij	3,853,000	16,176,000
Kuwait Oil Co. Ltd	5,942,007	25,009,157
	Barrels	
Arabian American Oil Co. ...	36,316,934	146,736,902
Bahrain Petroleum Co. Ltd ...	1,350,547	5,452,398
Getty Oil Co. and American Independent Oil Co. (Kuwait-Saudi Arabia Neutral Zone)...	3,940,984	15,441,518

The refinery throughput at Abadan of the Iraanse Aardolie Raffinage Mij for April was 1,292,000 tons, the total for 1 January to 30 April being 5,441,000 tons.

Crude processed at Aramco's Ras Tanura refinery during April was 6,763,536 brl, the total for 1 January to 30 April being 25,956,408 brl.

EVAPORATION LOSS CONTROL

The Engineering Committee of the Institute has decided to form a Sub-Committee on the subject of Evaporation Loss Control. Its terms of reference are:—

> "To discuss criteria, collect data, and if possible correlate methods to establish sound principles for estimating evaporation losses in the transport, storage, and distribution of petroleum and its products.
>
> "To maintain co-operation with corresponding API, ASTM, and other overseas committees on loss control matters.
>
> "To disseminate information on the effectiveness of loss reduction measures".

At a recent *ad hoc* meeting of representatives of Member-Companies operating in the U.K., it was felt that the subject was also of great importance and interest to overseas companies. Consequently, it is desired that invitations to serve on this Sub-Committee or its Panels should be sent to as wide a field as possible. The Sub-Committee would, therefore, welcome any approach by interested parties who would be willing to serve.

The Chairman elected is D. F. Tripcony, Esso Refinery, Fawley, Near Southampton, Hants, to whom all communications should be sent.

CANADIAN LIQUID HYDROCARBON RESERVES

The Canadian Petroleum Association has given a revised estimate of Canadian proven crude oil reserves as at the end of 1959 from those previously released this year and reported on page 143 of the May issue of the *IP Review*.

The new estimate for the whole of Canada is 3,497,124,000 brl, which is an increase of 331,220,000 brl over 1958. The change is caused by the amendment of the Alberta reserves to a figure of 2,898,878,000 brl from the previous estimate of 2,917,111,000 brl.

Estimated proven reserves of natural gas liquids and natural gas in Canada are unaltered from those previously published, being 502,145,000 brl and 26,605,336 million cu ft respectively.

Around the Branches

ABADAN, BAHRAIN, ESSEX, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN, SOUTH WALES, STANLOW, TRINIDAD, YORKSHIRE

Trinidad Branch

Geological Excursion

The Trinidad Branch held a geological excursion in south Trinidad on 13 March organized by C. C. Wilson, M. H. S. Barker, and G. E. Higgins. Some 40 members and guests enjoyed a tour from Quinam Bay on the south coast, inland and west through some of the oil-fields, to a resting place later in the day at Forest Reserve. The excursion was primarily arranged to show non-geologists some of the more interesting features of Trinidad geology, and why it is that geologists can get so enthusiastic over a few yards of "dirt". The party met at Forest Reserve and the majority proceeded by bus loaned for the day by Shell Trinidad, others following by car. At Quinam Bay the party walked a half-mile of beach and saw excellent exposures of well bedded, ripple-marked sandstones overlain by extensive slumped silt and sand beds into which a rubble bed had seemingly channelled. The rubble comprised large blocks and pebbles ranging from Upper Cretaceous to Lower Miocene in a matrix of Lower Miocene clays. From Quinam Bay the party moved along the many exposures in the Coora and Quarry Fields in Miocene and Pliocene sands and clays adjacent to the Los Bajos Fault, a major structural element in south Trinidad. A brief pause for refreshment was taken at the TPD Palo Seco Club, and was followed by a trek inland to the Anglais Point mud-volcano area returning via the beach to the Palo Seco Club for lunch. After lunch the party proceeded through the Palo Seco and Grande Ravine fields, following the Los Bajos Fault with exposures of disturbed and steeply dipping beds and areas of oil-impregnated sands and seepages. At this point, and towards the end of the day, some minor confusion arose as the leading cars disappeared to the last outcrop—the bus broke a front spring and was forced to limp home in another direction—to the Forest Reserve Club where a possibly better exposure of cold beer was fully appreciated by non-geologists and geologists alike.

Some of the party led by D. J. P. Holbrook in the bush near Anglais Point

At the scene of a recent upheaval in the Anglais Point mud volcano area. Gas pressure created a "blister" which subsequently collapsed back towards the vent, which is not visible but off the top right hand of the photo

The day was voted most enjoyable and the Committee has received many requests to stage another excursion in the near future.

Refining Inspection

On 25 March Robert Bentley, a Director of Solus-Schell Ltd, presented a paper on "Some Aspects of Refining and New Construction Inspection". The application of the X-ray, gamma-ray, and magnetic methods to non-destructive testing of materials and construction work were discussed. An exhibit of the equipment used for the various testing methods was arranged for the interest of members. An informative discussion followed the paper, and the meeting concluded with well-merited applause for Mr Bentley's able presentation of his subject.

Computers

On 11 April the 190th General Meeting of the Branch was held, at which Shelton Downey of IBM gave an introductory talk on the development and use of computers, with especial reference to oil industry problems. Mr Downey's introductory talk, sometimes in a light and amusing vein, dealt briefly but adequately with computers, computing language, and computer applications. A lively discussion followed, with many members participating, and covered a broad field of actual experiences in the use of computers, their costs, and savings resulting from their use. In the discussion Mr Downey was assisted by various members of the

IBM who were then in south Trinidad conducting "Petrocade", a symposia on computing machines and applications to problems covering the various fields of exploration, production, refining, accounting, and marketing.

Essex Branch

On 20 April, H. Hyams, the newly-appointed branch lecturer, delivered his talk on "Why International Standardization?" to the Essex Branch at the Bull Hotel, Pitsea.

The chairman, E. G. Hannah, in introducing the lecturer, spoke of his international reputation on matters connected with standardization relating to quality and quantity measurement of petroleum.

Mr Hyams stressed the wisdom of agreement on standardized methods and procedures between manufacturer and consumer. There were at least 40 countries which had national standardizing bodies, and of these 24 included petroleum products in their work. The development of co-operation between IP and ASTM in petroleum standardization was traced, and the success that had been achieved was highly praised by Mr Hyams. He also stressed the need for more rapid progress in the work of Technical Committee 28 of the International Organization for Standardization (ISO/TC 28). This Committee was concerned with standardization of test methods, sampling, bulk oil measurement, nomenclature, terminology, and specifications for petroleum products. Progress in this work had been far too slow in the 9 years since the Committee had been formed, and this was not in the best interests of an international industry such as oil.

The final part of Mr Hyams' talk was devoted to the advantages of using internationally-accepted standardized means of evaluating and controlling the quality of petroleum products, and the need for recognized procedures for measuring qualitatively and quantitatively products purchased and sold in bulk.

Questions and discussion took place on such matters as API gravity, specific gravity, and density; politics in international standardization; volume measurement by dipping and by meters; losses and loss control; universal use of the metric system; and how the use of international measurement procedures helps to avoid complaints and disputes.

Northern Branch

A joint meeting of the IP Northern Branch and the North-Western Branch of the Institution of Chemical Engineers was held on 26 April in The Chemical Engineering Building of The Manchester College of Science and Technology. The meeting was in the form of a discussion on the topic "Sealing against Pressure and Vacuum" and was opened by the chairman of the North-Western Branch of the Institution, Professor Frank Morton.

A total of four papers was presented. H. E. Charlton discussed "The Fundamental Factors of Valve Design". This paper dealt with the physical and mechanical factors which make for tightness in valve operation, and was well illustrated by "cut away" models of many types of valves.

V. J. Osola presented a paper entitled "Some Experiences in the Application of Mechanical Seals to Pumps and Stirred Pressure Vessels". The speaker emphasized that he was a non-expert user of mechanical seals, and he described in detail some of the problems he had experienced in their application to the manufacture of industrial chemicals. He explained how these problems had been overcome, and concluded the paper with some valuable advice to both users and manufacturers of these seals.

The third paper, "High Vacuum Closures", presented by A. W. Avery, described how the Atomic Energy Authority had dealt with the problem of sealing against vacuum at the high vacuum diffusion plant at Capenhurst, Cheshire; and in the final paper, "High Pressure Joints", W. R. D. Manning described how to seal against pressure. He explained that even though pressure differentials were much higher in his case, he knew from personal experience that Mr Avery had the harder job.

All the papers were well illustrated by slides, and a very lively discussion followed between the authors, representatives of manufacturing companies, members of both societies, and by members of the North-Western Branch of the Institution of Mechanical Engineers who were present by invitation. After the proceedings had been formally brought to a close by Professor Morton many members stayed on to carry on informal discussion, and to examine a working model provided by Mr Charlton to illustrate some points from his paper.

Stanlow Branch

The chairman of the Stanlow Branch, C. N. Thompson, introduced the three speakers at the Symposium on "People and Oil" which was held at Blossoms Hotel, Chester, on 16 March.

The first paper "Publicity", or as the author preferred to call it, "Advertising", was given by K. E. Shurey, of C. C. Wakefield & Co. Ltd. He began by saying that it was impossible to sell without advertising, and pointed out that classified and display advertising went back as far as 1761, when one of the products advertised was patent medicine.

Much of modern advertising was not actually to advertise the product but its brand image. It was also pointed out that different styles of advertising were used in different types of publication, *i.e.* in some, hire purchase price only was given; others, hire purchase plus cash; and others, cash only. Many different methods of approach had been tried, but to-day press and television were the main advertising outlets, and the whole subject was now worked out on a highly-scientific basis.

The second speaker, A. W. Deller of Shell Refining Co. Ltd, dealt with the subject of "Public Relations".

He defined public relations as a method of selling the company or organization, as distinct from advertising which aimed at selling the product. He pointed out that there were two definite methods used, namely (a) defensive and (b) constructive. The defensive method was more or less the same as putting out the fire once the fire had started, the constructive method being of importance in building up goodwill and understanding with the public. This was carried out by press handouts, special advertising, films, exhibitions, and visits to refineries.

The last speaker, E. S. M. Chadwick of BP (Llandarcy) Ltd, dealt with "Industrial Relations". He felt that this was not scientific, but was intimately tied up with human relations where, of course, wages were a very important item. The speaker dealt with various methods of fixing wages, namely by direct negotiation, negotiation between national associations of employers and trade unions, and negotiation between regional associations of employers and trade unions.

The pressure was always to improve standards of living, and the speaker quoted the following figures to show the most important items from the worker's point of view. From ten listed factors, the first four to be mentioned in order of preference were said to be: good wages (57 per cent); security (55 per cent); friendliness of workpeople (38 per cent); opportunities (33 per cent). Other points dealt with by the speaker were safe working conditions, satisfaction with the job, good communications, and justice and fair dealing in employee relations.

The discussion was opened by N. T. Cannon, and ended with a vote of thanks to the lecturers from the Chair.

The Bahrain Annual Dinner

A general view at the Bahrain Branch Fourth Annual Dinner

On the 26 November 1959 the Bahrain Branch celebrated the Fourth Annual Dinner to be held under its auspices. As a considerable number of the Branch's members are resident in nearby Qatar the practice has been instituted since 1955 of holding the dinner in Qatar on alternate years.

This was the second to be held in Qatar, with the Qatar Petroleum Co. Ltd acting as host for the week-end to some 49 non-Q.P.C. members of the Branch and their guests at the Company's oil-camp of Dukhan.

The majority of the visiting members and guests arrived in Dukhan on the afternoon of the 25 November and were welcomed to Qatar at a cocktail party in the evening.

On the morning of the following day a discourse on the history of the early European trading companies in the Persian Gulf was delivered by W. J. A. Livingstone, assistant chief representative of the Qatar Petroleum Company Ltd. The effect of those commercial enterprises on the history of the countries bordering the Gulf was discussed, as was the waxing and waning of different foreign as well as local powers up to the beginning of the present century.

At the Bahrain Branch Dinner—Mrs Thompson, Brigadier Tinker, George Beeby Thompson (chairman), and Mrs Tinker

Bahrain Branch Visit Qatar

On the occasion of the Bahrain Branch's visit to Qatar for the 1959 Annual Dinner some time was spent in the field. Pictures sent by the Branch show (top left) *Messrs P. A. Marshall, F. H. Shambrook, and R. Craig;* (top right) *a general view around the rig;* (bottom left) *H. Moir pointing out some items of interest to George Beeby Thompson and H. A. T. Howe;* (bottom centre) *Brig. Tinker followed by R. Milne and R. E. de Mestre;* (bottom right) *F. W. B. Harris, Mrs de Mestre, and J. R. Lewis*

Guest of honour at the dinner, which was attended by representatives of nearly all the oil companies operating in the Persian Gulf, was Brigadier Tinker who, when proposing the toast of the Institute, eloquently recalled the great strides in mechanization which modern armies have made in the recent past and their dependence on oil.

A total of 92 members and guests attended the Dinner, which was presided over by George Beeby Thompson, chairman of the Branch.

W. J. A. Livingstone addressing the Bahrain Branch on early European traders in the Persian Gulf

Yorkshire Branch at Golf

Members of the Yorkshire Branch of the Institute were once again invited to take part in the Annual 18-hole Medal Tournament held at Wetherby Golf Course on Wednesday the 18 May 1960 by the Yorkshire Lubricating Oil and Grease Trades Association. Lunch was taken in the Clubhouse at 1 p.m. and approximately fifty entrants then changed into their golfing outfits and commenced the usual warming-up exercises prior to the start at 2.30 p.m.

In addition to the Annual Newsome Trophy, which has been competed for by members of the Y.L.O. & G.T. Association for many years, there was an additional incentive this year, for which members of the Institute could play. This was in the form of a most delightful Trophy, very kindly presented to the Yorkshire Branch by E. T. Newsome of Messrs T. H. Newsome & Co. Ltd, Knottingley, to be awarded to the best net performance by an Institute member. Before the start each participant had to indicate for which trophy he was playing and in addition a special award was to be presented for the best round by a novice. Incidentally, the Novice Section was made up of nearly one-third of the total entrants.

After a very sunny morning the afternoon was extremely dull and overcast, whilst a strong south-westerly wind caused many a well hit tee shot to drift, particularly on the way home. Fortunately, the impending rain kept off and everyone completed the course safely, even though high tea had to be served at 7 p.m. without the last four of the novices, who were still thrashing their way round the river side. We did hear of one couple who lost ten balls in the process! Everyone had developed an enormous appetite, and the ham and egg tea went down extremely well.

All arrangements for the competition had been made by Trevor Newsome and his compatriots in crime J. Dixon and H. Wells. After this threesome had added up the final cards all was ready for the very pleasant and informal presentation of trophies in the dining room.

The president of the Oil & Grease Trades Association, G. R. Hey, acted as chairman, and he was very pleased to award the Association's Newsome Trophy to G. Battye, who had a net figure of 69. Trevor Newsome then formally handed the new trophy to the Yorkshire Branch of the Institute, and in the absence of the chairman this was received with grateful thanks by A. Furness, the honorary secretary.

B. N. Bennison with the IP Yorkshire Branch Golf Trophy with (left to right) *E. T. Newsome, donor of the Cup, G. Hey (president, Yorkshire Lubricating Oil and Grease Trades Association), R. G. Prophet, and A. Furness (Branch honorary secretary)*

The first winner of the IP Trophy was B. N. Bennison, with a net figure of 70. There was also a second prize to the next best performance by an IP member; this was a many coloured golf umbrella awarded to N. J. Wilson. Of the novices, a few of whom had returned excellent scores, S. Cropper won with a net figure of 71. A delightful touch was lent to the proceedings by the information that W. Aske, of Halifax, had decided, whilst on his way to Wetherby that same day, to donate a prize which was to be presented to the best score by an "over 50". To everyone's surprise and particularly to Mr Aske he won the prize himself and he was thus left to buy something suitable before the 1961 Tournament.

The evening finished with the usual liquid refreshment and banter round the bar. No doubt there will be many new golfing stories told of the 1960 Annual Golf Tournament.

Lectures and Conferences

Current Practice in Fuel Efficiency

The seventh NIFES annual residential refresher course will be held at the Clarendon Laboratory, Oxford, on 26–30 September 1960. The course covers a wide range of subjects in the sphere of current fuel efficiency practice, and each of the lectures is presented by a speaker eminent in the special field to be covered.

Included in the subjects for discussion will be, Oil Burning Efficiency, Recovery and Use of Waste Heat in Industry, Automation and its Impact on the Plant Engineer, Factors Affecting the Choice of Industrial Boiler Plant, Industrial Application of Low Temperatures, The Value of Instruments and Automatic Control, and The Efficient Use of Compressed Air.

The fee for the course, including accommodation, is 15 guineas. Full details may be obtained from the Course Secretary, NIFES, Ailsa House, 181 King's Road, Reading, Berks.

Non-Destructive Testing

A conference on the "Theory and Practice of Ultrasonic Inspection" is to be held at the Queens Hotel, Cheltenham, on 22–24 September 1960. The arrangements are being made jointly by The Institute of Physics' Non-Destructive Testing Group, The Society of Non-Destructive Examination, and The Non-Destructive Testing Society of Great Britain.

Further details of the programme, and of hotel accommodation in Cheltenham, can be obtained from the conference secretary, I. M. Barnes, Materials Laboratory, de Havilland Propellers Ltd, Hatfield, Herts.

Public Works and Municipal Services

The seventeenth Public Works and Municipal Services Congress and Exhibition will be held at Olympia, London, on 14–19 November 1960.

The Congress and Exhibition is intended to provide for those interested in the subject a forum for discussion on public and municipal services, and a market-place for materials and machinery. Congress sessions, which are open to all visitors, take place throughout the week. The full programme of subjects to be discussed will be available at a later date. Further particulars may be obtained from the Congress Secretary, C. W. Scott-Giles, O.B.E., M.A., 25 Victoria Street, London, S.W.1.

Iranian Oil Development in 1959

A brief outline of some of the progress made in oil development in Iran during 1959 was given by B. Mostofi, a director of the National Iranian Oil Company, in an address to the annual general meeting of the Economic Commission for Asia and the Far East, held in Bangkok recently.

Exploration

The tempo of oil exploration in Iran was said to have increased during the year. A total of 59 geological and 80 geophysical party months were spent in exploration on land and in the Continental Shelf of the Persian Gulf. Drilling footage totalled over 16,000 ft, of which more than 30 per cent was exploratory drilling in hitherto unexplored areas. In the Continental Shelf two marine drilling units began work during the year. As a result, a substantial increase in Iran's total petroleum reserves is reported.

Petrochemicals

The establishment of the petrochemical industry in the south and south-western part of Iran was also said to be progressing. In particular the fertilizer plant at Shiraz and the carbon black factory in Khuzestan were mentioned.

Production

Production of crude oil in south-west Iran was said to have been 343 million brl in 1959, an increase of 13 per cent. Total oil production in Iran during the year was obtained from about 100 wells, which, on the average, produced about 10,000 bd each. Of this, some 109 million brl were refined at Abadan refinery, and about 70 per cent of the refined output was exported to the countries of the ECAFE region.

Petroleum Consumption

Internal consumption of petroleum products rose by 18 per cent during 1959, reaching a total of 21 million brl.

Further information has also been received from NIOC on other aspects of oil operations in Iran. The highlights of this are as follows.

Pipelines

The 940-km Abadan-Tehran pipeline has been extended by a further 850 km.

The contract for the construction of a pumping station at Abadan for the supply of the final throughput of the Ahwaz-Tehran section of the Trans-Iranian pipeline and local Ahwaz requirements has been given to Entrepose, the French company. Four pumping sets will be installed initially, with provision being made for the future installation of an additional pumping set.

Progress on the second phase of the Trans-Iranian pipeline has been a little slower than expected. Some of the stations will be complete before the end of this summer and the remainder will be ready for next winter. Excellent progress is reported on the 8-in extension line from Tehran to Shahroud, and it should be ready for commissioning by the end of July 1960. Installations on the 320-km, 6-in line from Tehran to Resht were due for completion by the end of June 1960.

An average of 3000 metres of pipe a day is being laid on the Gachsaran-Shiraz natural gas pipeline project, and the half-way mark has been passed.

Refining

Output at the Kermanshah refinery during 1959 was as follows:

	barrels
Motor spirit	368,041
Kerosine	276,902
Gas oil	22,951
Fuel oil	85,906

Naft-i-Shah Production

Net output of the Naft-i-Shah field in 1959 was 1,914,760 brl.

Exploratory Drilling

Further details of land drilling progress of companies in which NIOC have shareholdings are as follows, at the last week in April (offshore activity was reported in the Persian Gulf survey of *IP Review* June 1960).

NIOC Alborz No 8: depth 11,531 ft.

Sarajeh No 3: depth 11,500 ft, with a core cut between 11,433 and 11,464 ft.

Sarajeh No. 4: depth 11,825 ft with last casing at 9231 ft. Drilling continues in re-drill hole.

A seismic crew and a gravimetric crew are working at Siah Kuh in the Central Plain. One geological crew is operating at Kerman and another at Tabriz.

SIRIP

The Sequta well in the Zagros agreement area has reached 3687 ft. Air drilling continues in limestone and shale formations.

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ROCKET FUEL RESEARCH

A special rocket fuels testing structure in the shape of a sphere will be built by Esso Research and Engineering Co. at Linden, New Jersey.

The project represents the newest stage in the Company's efforts to develop super rocket fuels, and research has progressed to the point at which experimental propellants weighing up to 2 lb can be tested. This calls for a larger special test-firing chamber, which will be met by the sphere.

Inside the 18-ft high metal "ball" will be a test stand for small stationary rocket motors. Small quantities of potential solid propellants placed in the motors will be fired by remote control from an adjoining laboratory. Pressure in the sealed sphere can be reduced to simulate high altitudes, and a special design deadens sounds and permits all exhaust materials to be contained.

The sphere is part of a $266,000 expansion of rocket fuels research facilities at Linden. A laboratory housing five test cells in which new propellant ingredients will be synthesized by remote control, is also to be built.

Seven similar cells are already in use there for these and other chemical studies. Promising propellants will be further tested at a U.S. Army Ordnance installation.

A special team of scientists—now numbering 33 research specialists and 19 technicians—was set up to conduct the work in December 1958, with the aim of producing solid propellants more powerful than any now known.

British Petroleum Company's 1959 Operations

In The British Petroleum Company's 1959 *Annual Report and Accounts*, the chairman, Sir Neville Gass, K.B.E., M.C., emphasized that the fiftieth anniversary of the Company's formation had been in April of that year. On a personal tour of BP activities in many countries during the year he had been able to see for himself just how far the Company's various operations had grown since the days of the first concession in Persia.

The Group's income, before taxation, was £131 million. This was £7 million less than in 1958. Due to the reduction in the charge for taxation the Group's net income, at £63 million, was practically the same as in 1958. The latter figure can once again be compared with the total payment of £115 million to the Middle East producing countries under fifty-fifty agreements.

The chairman commented on the international state of the oil industry in the following terms.

"Turning to the general position of the industry, 1959 showed an appreciable recovery in the rate of expansion of demand, but the industry is likely to have to face the difficulties due to the over-abundance of available supply for a further considerable period. Various factors are tending to concentrate the difficulties in the Eastern Hemisphere, where we are mainly concerned, rather than in the Western Hemisphere. Much of the oil shut out from the U.S.A. by the import restrictions there is in the hands of U.S. concerns who had developed production in Venezuela and elsewhere for the specific purpose of supplementing U.S. domestic resources for the U.S. market; being now left without that outlet they are looking for other outlets in competition with existing supplies from Eastern Hemisphere production. In South America, to which we and other Eastern Hemisphere producers have supplied very considerable quantities, greater activity to foster indigenous production has had the effect of reducing import needs."

After discussing the commencement in 1959 of substantial exports of Saharan oil, and the forthcoming availability in large quantities of both Saharan and Libyan crude oil with its favourable geographical position, together with the growth of Russian oil exports, the chairman continued as follows.

"In all these circumstances it should not be expected that the growth of Middle East production will continue at the same high rate as during the last decade. With the increase in the number of sources from which oil is now available, it is inevitable that the previously developed sources will not continue to meet the same proportion of the total demand in those consuming areas which are most liable to be affected by supplies from new sources on geographical considerations. It is to be hoped that the increasing supplies from new sources will come into the supply pattern in a steady and not disruptive manner. Forced development can disregard the interests of established supply sources which continue to be needed for the fulfilment of the total requirements and for many of which the maintenance of oil revenue is essential for their social and economic development, itself indispensable for progress and stability."

Production

In 1959 the Group's major sources of crude oil were once again Iran, Iraq, Kuwait, and Qatar. Total BP share of the crude oil production of the companies in which it holds interests was 65,157,000 tons, a considerable increase over the previous year in spite of the fact that output declined in Kuwait, Qatar, and fractionally, in the Mosul Petroleum Co. Ltd's area of Iraq. Production of Scottish shale oil also fell by 3000 tons below the previous year.

Details of the BP Group's shareholding in producing companies, and the total production by each company, are given in Table I.

Exploration

In Iran, oil was found at the exploration wells at Ahwaz and Binak, and production tests are in progress. Exploration wells were begun at Mand, some 50 miles south-east of Bushire, and early in 1960 at Suru in the Bandar Abbas area.

The Kuwait field at Raudhatain was brought into production in March 1960 after development had continued during 1959. A further appraisal well is being drilled at Minagish, and in the latter part of the year a marine seismic survey was carried out in the present agreement area.

Production from the Bai Hassan field, Iraq, is due to begin shortly, and exploration work in other areas continues.

TABLE I

Company	*BP Group shareholding per cent*	*Total crude oil production* 1959 *Tons*	1958 *Tons*
KUWAIT			
Kuwait Oil Co. Ltd ...	50	68,437,000	69,117,000
IRAN			
Iraanse Aardolie Exploratie en Productie Mij NV (through Iranian Oil Participants Ltd)	40	44,677,000	39,780,000
IRAQ			
Iraq Petroleum Co. Ltd ...	23⅞	27,330,000	22,633,000
Basrah Petroleum Co. Ltd	23⅞	12,297,000	11,019,000
Mosul Petroleum Co. Ltd	23¾	1,271,000	1,280,000
QATAR			
Qatar Petroleum Co. Ltd	23¾	7,867,000	8,092,000
TRINIDAD			
Trinidad Petroleum Development Co. Ltd ...	77	862,000	726,000
Trinidad Northern Areas Ltd	33⅓	528,000	277,000
EGYPT			
The Anglo-Egyptian Oilfields Ltd	31	510,000	*
NIGERIA			
The Shell-BP Petroleum Development Co. of Nigeria Ltd	50	551,000	257,000
UNITED KINGDOM			
BP Exploration Co. Ltd ...	100	83,000	80,000
Scottish Oils Ltd (Shale Oil)	100	60,000	63,000
CANADA			
Triad Oil Co. Ltd ...	51½	123,000	104,000
GERMANY			
Gewerkschaft Norddeutschland	100	6,000	4,900
SICILY			
Compagnia Idrocarbari della Sicilia D'Arcy SpA			

* Under sequestration in 1958

Three offshore wells have now been completed by Abu Dhabi Marine Areas. Preparations are in hand for the installation of facilities for regular production.

In 1959 U.K. crude oil production totalled 83,000 tons, and included that from the new producing areas of Bothamsall, Gainsborough, Corringham, and Kimmeridge. The search for both oil and natural gas continued without any significant discoveries being made.

Further test drilling was continued in the Rhone Valley, and a seismic survey was carried out in south-west France. By the end of the year, however, the Group's exploration activities in continental France were suspended.

Operations were also brought to an end in Malta (after the drilling of a 9736 ft test well near Valletta) and in Sicily, where test production of the heavy asphaltic crude at Vittoria was found to be uneconomic.

In Nigeria the development of the Bomu, Oloibiri, and Afam fields continued, and a new field at Ebubu was brought into production. All four fields are now linked by pipeline with Port Harcourt. During the year 34 exploration wells were drilled, of which seven have produced oil on test. The successful discovery at Ughelli was the first of such to be made in the Western Region.

Exploration continued in the areas of the Algerian Sahara held by Société des Pétroles de Valence. These areas now cover a total of 19,000 sq km, and drilling of the first deep test, at El Arich el Megta, began in November. In Libya a fourth test well is being drilled. The property of The Anglo-Egyptian Oilfields Ltd was desequestrated in April 1959.

Drilling continued in Papua. Two deviated holes were drilled from Puri No. 1, but inadequate reservoir conditions were found. In September a considerable flow of gas was obtained from a deep test at Bwata, 15 miles north-west of Puri, which was suspended early in 1960.

Refining

The Group's total refinery throughput in 1959, and including crude oil refined under certain processing arrangements, was just under 39 million tons. This was about one million tons more than the total for the previous year. Details are given in Table II.

There was an increase in throughput of over 1·3 million tons following the expansion at the Kent refinery, and 160,000 tons of aviation gasoline were produced during the year. A plant for the production of sbp spirits is at present under construction, and is expected to be commissioned towards the end of 1960.

Crude oil to the amount of 129,000 tons was processed on behalf of the Group at the new Whitegate refinery of the Irish Refining Co. since its commissioning last May.

It is expected that the new refinery at Dinslaken, in the Ruhr, will be commissioned in the early part of this summer. Further additions to European refinery plant include a dewaxing unit being installed at the Oelwerke Julius Schindler refinery at Hamburg; units building for the treatment of cracked gasolines at Lavera refinery which are returned from the Naphtachimie petrochemical plant; and at the Venice refinery, a hydrofiner which was commissioned in August, and a new catalytic reformer due for completion during 1961.

At the Kuwait refinery a small catalytic reformer for production of high grade spirit for the local market has been in operation since June. At Abadan a 20,000 bd catalytic reformer is to be built, and in Turkey the new 3,200,000 tons/year refinery, in which the Group is interested, is now under construction.

TABLE II

Company	*Refinery Location*	*BP Group shareholding per cent*	*Total throughput* 1959 *Tons*	1958 *Tons*
UNITED KINGDOM				
BP Refinery (Grangemouth) Ltd	Grangemouth	100	2,431,000	2,053,000
BP Refinery (Kent) Ltd ...	Isle of Grain	100	7,138,000	5,815,000
BP Refinery (Llandarcy) Ltd	Llandarcy	100	2,824,000	2,782,000
Scottish Oils Ltd	Pumpherston	100	140,000	143,000
ADEN				
BP Refinery (Aden) Ltd ...	Aden	100	4,121,000	3,758,000
AUSTRALIA				
BP Refinery (Kwinana) Ltd	Kwinana	100	2,445,000	2,691,000
BELGIUM				
Société Industrielle Belge des Pétroles SA ...	Antwerp	50	3,517,000	3,588,000
Tankage et Transport SA	Antwerp	100	141,000	137,000
EIRE				
Irish Refining Co. Ltd (through Shell-Mex and B.P. Ltd) ...	Whitegate	16	680,000	—
FRANCE				
Société Française des Pétroles BP	Dunkirk	70	1,962,000	2,117,000
	Lavera	70	2,349,000	2,997,000
GERMANY				
BP Benzin und Petroleum AG ...	Hamburg	100	1,705,000	1,627,000
Oelwerke Julius Schindler GmbH	Hamburg	97	293,000	306,000
IRAN				
Iraanse Aardolie Raffinage Mij NV (through Iranian Oil Participants Ltd)	Abadan	40	15,459,000	14,986,000
ITALY				
Industria Raffinazione Olii Minerali SpA	Venice	49	1,633,000	1,385,000
KUWAIT				
Kuwait Oil Co. Ltd	Kuwait	50	7,055,000	5,939,000
LEBANON				
Iraq Petroleum Co. Ltd ...	Tripoli	23¾	181,000	305,000

BP is also participating in new refineries which are to be built in New Zealand, Algiers, Durban, and Mombasa, and in addition in refinery projects which are under consideration for Nigeria, Strasbourg, and Northern Ireland.

Petroleum Chemicals

The Group's petrochemical operations once again increased in size and scope during 1959.

In the U.K., Grangemouth plants for the manufacture of high density polyethylene, cumene, phenol, and acetone were brought on stream. When the third ethylene plant is commissioned in mid-1960 combined feedstock requirements of

the three cracking plants at British Hydrocarbon Chemicals will be nearly one million tons/year.

In France, new plants for propylene oxide and propylene glycols were commissioned for Naphtachimie SA, and a new cracker and a second ethylene oxide plant are scheduled for mid-1960.

Completion of the first stage of construction of the Erdolchemie GmbH plants, in Germany, are announced, including those for the manufacture of ethylene oxide, ethylene glycols, and propylene oxide. Construction of the second stage plants, which will approximately treble ethylene and ethylene derivative capacity, was almost completed in 1959.

Sea Transport

At the end of 1959 BP Group tankers totalled 144 ships of 2,644,000 dw tons, compared with 157 ships of 2,600,000 dw tons at the end of 1958. Of the 1959 tonnage, 48 per cent consisted of vessels of 28,000 tons or over.

Tankers totalling 36 in number and ranging from 15,000–65,000 dw tons were under construction or on order at the end of the year.

Associated fleets (in which BP has a 50 per cent interest) comprised the following vessels in operation or now building.

The Lowland Tanker Co. Ltd: ten 16,000-ton tankers in service and five 19,000-tonners on order for 1960-61 delivery.

Nordic Tankships I/S, of Copenhagen: two 35,000-ton tankers in service.

Warwick Tanker Co. Ltd: two 35,000-ton tankers, the first of which is in commission and the second recently launched.

The Group also has about 2,800,000 dw tons of tanker shipping on charter—slightly less than a year ago.

Sales

Total sales of crude oil and products in 1959 were approximately 65 million tons, an increase of over 4 per cent compared with the previous year. Of this, inland product sales rose by nearly 10 per cent.

Capital Expenditure

Total capital expenditure of the Group during 1959, including that for non-consolidated subsidiary companies and BP's proportion of expenditure by allied companies, was made up as follows:

	1959	1958
	£	£
Exploration and production	34,750,000	39,000,000
Refineries	39,750,000	40,000,000
Tankers*	24,000,000	23,750,000
Distribution and marketing facilities, etc.	42,250,000	34,750,000
	140,750,000	137,500,000

* Before deducting sales under tanker finance arrangements.

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Notes of the Month

Shell-Mex and B.P. Road Safety Award

A Rochdale bus driver, Ernest Smith, is the first holder of Shell-Mex and B.P's national trophy for the person judged to have made the greatest contribution to child road safety last year.

Mr Smith received the trophy from Ernest Marples, Minister of Transport, at a lunch at Grosvenor House, London, on 28 April.

Mr Smith receives the Trophy from the Minister of Transport

Introducing Mr Marples at the presentation ceremony, C. M. Vignoles, managing director of the Company, highlighted the tragedy of road accidents to children. He said that grown-ups sometimes had themselves to blame for any injuries they might suffer on the roads, but when a child was hit only a grown-up could be blamed. "All of us, adult responsible citizens, have their lives in our hands".

That was said to be the theme of the national trophy, a piece of glass with an engraving of two children standing within the protection of two large open hands.

Presenting the trophy, Mr Marples said that the greater part of Mr Smith's contribution had been made during his spare time, on his own initiative, and at his own expense.

Thanking Mr Vignoles and Shell-Mex and B.P. for presenting the national trophy, Mr Marples also referred to the cartoon films produced by the Company and shown on television and in cinemas.

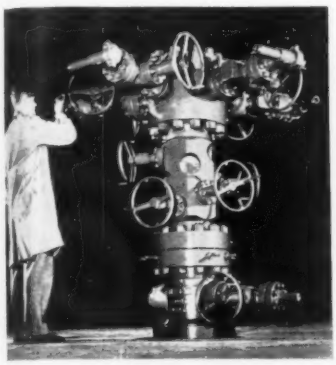
Citations for the trophy were submitted by local authorities in England, Scotland, and Wales. They were examined by the Accident Prevention Federations of the Royal Society for the Prevention of Accidents, each of which selected one nominee. The winner was then selected from these nominees by two panels composed of various people particularly concerned with the welfare of children and road safety.

Mr Smith is an instructor and an examiner in the National Proficiency Scheme for Child Cyclists. He runs road safety concert parties, children's road safety clubs, writes road safety songs and scripts, and has constructed ingenious magnetic instructional models on the subject.

Quintuple Well Completion

The world's first quintuple wellhead has been installed by the Sinclair Oil & Gas Company on a well in the Gulf of Mexico.

The equipment was designed and built for use in Sinclair's well OCS 0439 No 6, in Block 190, Eugene Island area, offshore coast. This is a joint venture in which Sinclair, Sohio Petroleum Company, El Paso Natural Gas Company, and Peoples Gas Light and Coke Company each hold a 25 per cent interest.



Sinclair is completing the 7981-ft well in six zones, five of which may be produced simultaneously. The bottom two producing zones will be completed selectively by using side-door chokes or similar equipment. Maximum shut-in pressure anticipated is 3000 psi.

The "Christmas tree", seen in the picture, includes a tubing spool, tubing hanger, quintuple port flow tree, crown member, and flow fittings manufactured by the National Supply Company, and a master valve assembly, consisting of two quintuple ported block valves, purchased from another manufacturer.

From the bottom of the tubing spool to the uppermost flow line plugs, the tree is 10 ft 1 in high, and weighs approximately 9100 lb.

All five tubing strings were run simultaneously and were not strapped together. After the tree was installed and the mud displaced from the tubing strings, hydraulic packers were set and actuated selectively by applying differential pressure across each one. This is done by pumping a ball or a plug down the tubing string until it seats in the packer. Application of a predetermined amount of additional pressure above the ball energizes the packer. After the packer is set, the ball is recovered by well flow or reverse circulation.

Installation was made from Dixilyn Drilling Corp's mobile offshore drilling platform, the *Julie Ann*. The well was drilled from this platform, using a National Type 1625-DE rig.

Shell to Build Rubber Plant in U.S.A.

Shell Chemical Company Division of Shell Oil Company is to increase its production of polyisoprene, the man-made equivalent of natural rubber, to 120 million lb/year.

This increase in capacity will involve construction at a U.S. Midwestern location of an integrated monomer-polymer plant of 80 million lb annual capacity. Hydrocarbon feedstocks for the plant will come from Shell's Wood River refinery.

Shell *Isoprene* rubber has been manufactured commercially on a scale up to five tons per day at Torrance, California, for slightly over a year. The new rubber has been used in a wide variety of products, ranging from elastic bands to huge tyres for earth-moving machinery. The Torrance plant is currently being expanded to a capacity of 40 million lb/year of polyisoprene, with completion of construction expected this autumn. The Midwest installation, presently in an advanced stage of engineering design, will be on stream one year later.

Forth Chemicals Expansion

The styrene plant at Grangemouth of Forth Chemicals Ltd (British Hydrocarbon Chemicals and Monsanto Chemicals) is being expanded for the third time since production commenced in 1953. This will bring its total capacity up to some 50,000 tons of monomer per annum by the end of 1960.

Lubricating Oil Plant for Kwinana

The British Petroleum Company is to build a lubricating oil refinery with a capacity of about 100,000 tons year of high quality lubricants at Kwinana, in Western Australia. The BP refinery at Kwinana produces a full range of petroleum products, excepting lubricants.

The lubricating oil refinery will cost approximately £8.5 million sterling to build. Construction is expected to start later this year and the plant should be commissioned in 1963. When commissioned, the new refinery will produce basic lubricating oils for the Australian and export markets

New Mobil Bulk Plant in Scotland

Mobil Oil Company is now operating the first distribution bulk plant in Scotland to serve its automotive fuel market north of the border. The plant is a temporary installation located at Bathgate, West Lothian, mid-way between Edinburgh and Glasgow, and in the centre of the marketing area in southern Scotland.

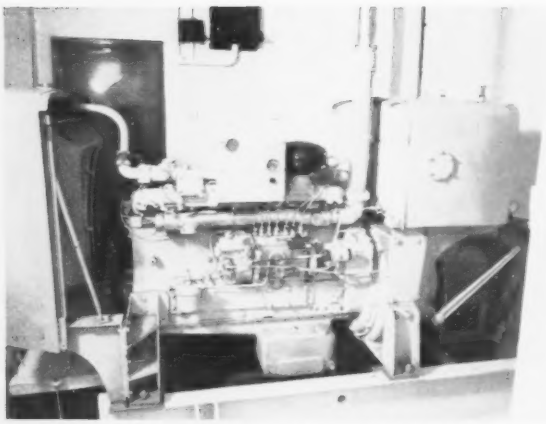
The new plant has been built by John Laing and Son Ltd. On the site are offices and loading bays, and five storage tanks with a combined storage capacity of 60,000 gallons for the storage of motor spirit, derv fuel, and gas oil. An all-electric pumping system has been installed to provide separate pumping and piping facilities for each product.

Tankers loading at Mobil's temporary bulk installation at Bathgate

The bulk plant will be supplied by road tankers from the Company's sea-fed terminal at Sunderland, and sales deliveries from the plant will be made by road.

The Testing of Aviation Fuel Filters

AN IMPORTANT AIR BP DEVELOPMENT



Variable speed 85 hp diesel motor driving the 6-in centrifugal pump

With the increasing use of turboprop and jet turbine aircraft the problem of preventing fuel contaminated by solids or by water from reaching the engine has become a major one. Compared to the piston engine, the turbine engine is much more sensitive to these contaminants, and careful control at all stages of transport from refinery to aircraft is necessary. An essential part of this control is the use of efficient filters and water separators in the fuel dispensing system. So far, there are no universally-accepted specifications for such filters and separators.

To ensure that filtration and separation equipment is really efficient some form of performance test procedure is necessary. After many years of experimental work, The British Petroleum Company has perfected equipment and procedures for this purpose. The procedure is in fact in three stages. First, laboratory tests assess the efficiency of the filter medium, the second stage being full-scale rig tests to assess the performance of complete units at their rated flow. Finally there are field tests under normal operating conditions at airfields at which Air BP operates.

In the initial stages the full-scale rig test was carried out at the BP Research Centre, Sunbury-on-Thames, in a rig rated at 260 gpm. With increased fuelling rates more efficient filters and separators were demanded, and for this purpose BP designed and constructed the BP Filtration Unit which has been installed at Flight Refuelling Ltd, Blandford, Dorset. This rig is capable of a flow rate of 500 gpm with aviation kerosine and performs various test sequences to assess filtration and separation units against high standards. A brief description follows.

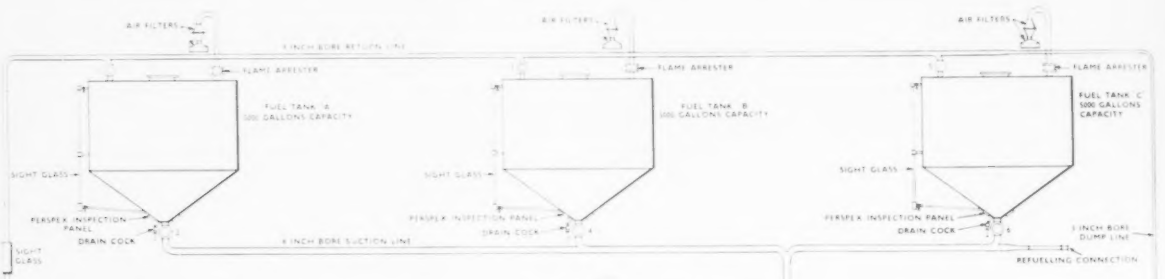


DIAGRAM OF COMPLETE RIG CIRCUIT

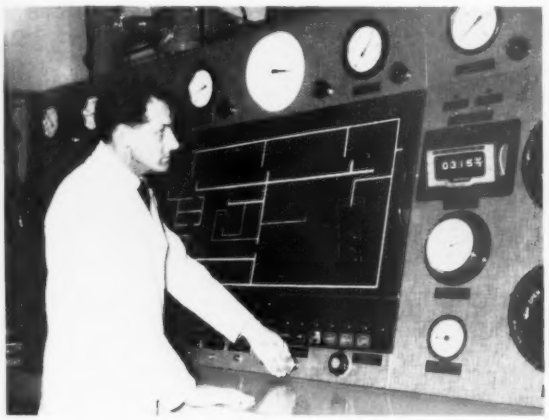
The Filtration Unit

The basic circuit of the rig consists of three 5000-gallon storage tanks, which can be individually isolated and from which a 6-in pipe feeds a Pegson-Marlow centrifugal pump. From the pump, fuel is fed via 4-in lines to any one or all of three circuits: (i) unit under test; (ii) by-pass or mixing; or (iii) clean-up. There is also a reverse flow circuit discharging into a separate 3000-gallon tank.

(i) *Unit Under Test Circuit.*—After passing through the unit under test, the fuel is metered by two Avery-Hardoll rate-of-flow and integrating meters. Sight glasses and sampling points are provided, as well as pressure gauges and a temperature gauge.

(ii) *By-pass or Mixing Circuit.*—This circuit is three-fold in purpose: (a) for mixing contaminant and giving a good suspension when circulating from one tank to another; (b) for removal of contaminant from fuel before a new series of tests; (c) for reversing fuel flow through test unit when making backflushing tests.

(iii) *Clean-up Circuit.*—During a test on a unit, the circulating fuel has to be cleaned at high rates. The desired rate is achieved by having two microfilters and water separators in the rig circuit, and these can be used alone or in combination.



Control panel and illuminated diagram

Reverse Flow Circuit

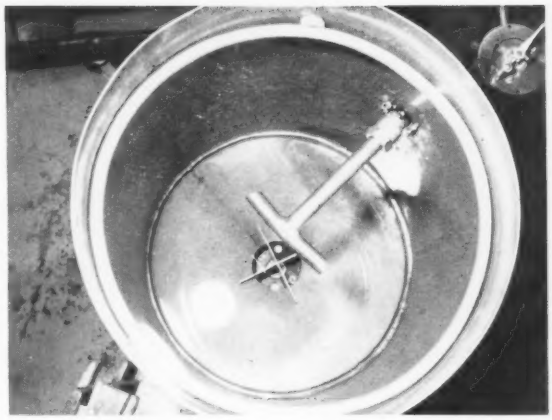
It is claimed for some microfilters that they can be cleaned by reversing flow through them. After passing through the unit in a reverse direction, the fuel goes to the 3000-gallon dump tank and then to main storage.

Flow Control

Control of flow to within approximately 51 G per min is achieved by the use of a 6-in centrifugal pump in combination with a control valve. Finer control is obtained by a by-pass circuit with a fine regulating valve across the flow control valve.

Water Injection

When testing water separators measured quantities of water are injected into the main fuel stream at the fuel pump inlet. Water from an air-pressurized 1000-gal capacity storage is fed into the stream either at a 100-per cent rate or through rotameters at rates between 0·02 to 35 gallons per minute.



The contaminant mixing system

Solid Contaminant

For injecting solid contaminants a batch system is used at present but a continuous system is being developed.

Fuel from the main circuit can be isolated into a small vertical tank and, during the recirculation operation, zinc dust is added until a slurry is obtained. This is injected into the fuel stream as required.

Control Panel

The rig is controlled by one operator at the control panel which is supplied with pressure gauges, flowmeters, control valves, and pump speed controls. When a particular circuit is in operation it is illuminated on a diagram in the centre of the control panel.

Laboratory

Laboratory facilities are available for examination of slides for particle counting, for water determination by Karl Fischer or Dean and Stark methods, and for measurement of interfacial tension.

★ ★ ★

DRACONE IN NEW YORK HARBOUR

The Dracone flexible barge, the British invention for towing cargoes by sea in a giant sausage-shaped container made of rubber and nylon, had its first public showing in the U.S.A. on 19 May.

A special demonstration was staged by Esso Standard Division, Humble Oil and Refining Company, in New York harbour, which was attended by oilmen from all over the U.S.A., being specially arranged by Esso for its own executives and those of affiliate companies.

The Dracone which was used for the demonstration will hold at least 35 tons of oil when loaded. It had arrived empty a week previously, packed in a small parcel in the hold of the *Queen Elizabeth*.

In Britain, Esso Petroleum already has Dracones in regular use for towing oil cargoes between Southampton and the Isle of Wight.

An aerial view of the terminal

Mobil Oil Co's Ellesmere Port Terminal

The Ellesmere Port ocean-fed terminal of Mobil Oil Co. Ltd, in Cheshire, was opened in November 1959. It is situated 2¼ miles from the Queen Elizabeth II oil dock at the entrance to the Manchester Ship Canal. At the dock the supplies for the terminal are discharged from ocean-going and coastal tankers from Coryton refinery, and pumped through three pipelines to Ellesmere Port. The lines, which are mostly above ground, are composed of one 18-in black oils line, one 10-in gas oil/derv fuel line, and a 10-in line for the three grades of motor spirit supplied from the terminal.

The terminal site covers 32 acres in all, of which 18 acres have at present been developed. Tank farm facilities comprise four tanks of 13,000 tons, six of 4000 tons, and four of 2500 tons. All are of the fixed roof variety, with foam and water quenching devices. Remote readings of tank gauges are done from the control point. The three grades of motor spirit, and the derv fuel, are piped from the tankage to the filling gantries. There are fourteen loading points, automatic ticket loading systems with independent pressure control switches being controlled by individual drivers.

One of the most interesting features of the terminal is the system of fuel oil and gas oil blending whereby light, medium, and heavy grades of fuel oil are produced for customer requirement.

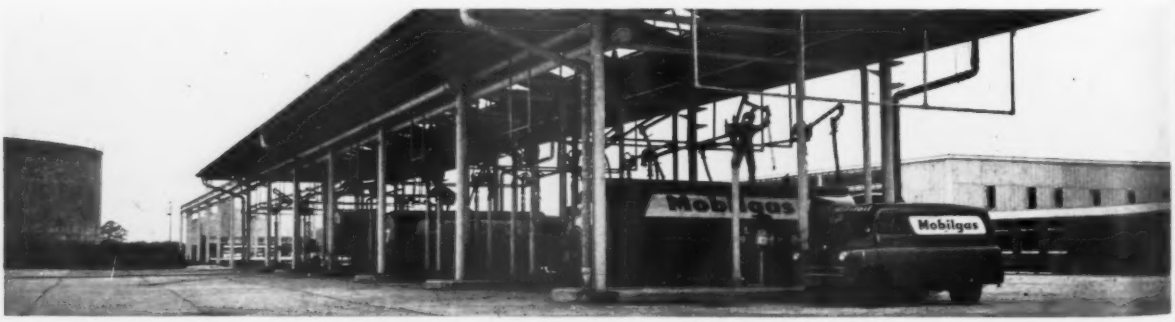
Up to the end of the second world war the blending of fuel oils was carried out at the manufacturing source by batch blending into storage tanks. To meet marine and industrial requirements, the products were well defined into a total of five grades.

Although reduction of the number of intermediate grades to a limited number of commercial products of given viscosity is advantageous, specification grades are still required by different types of consumer. It can readily be seen, therefore, that where several grades of fuel oil are to be held at strategic locations, the call upon tankage is heavy, and represents one of the largest investments of capital for construction work in the marketing field.

The introduction of in-line blending of fuel oils at the distribution points has therefore resulted in a great saving in tankage, with its consequent reduction of capital investment per ton of storage, and at the same time has permitted the delivery to these distribution centres of two grades only, but in much larger consignments.

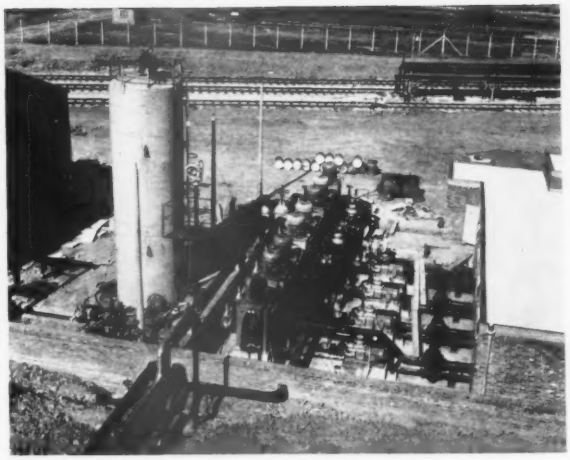
The intermediate grades, made up of a blend of the two base stock oils, fall within the range of a light fuel oil and a heavy fuel oil. The permissible marketing range for each may be as wide as 100-seconds Redwood I—a total variation of up to approximately 15 per cent in viscosity on the lighter fuels. In-line blending of the fuels within these somewhat broad limits is now commercial practice, but it was also at this point that the need was felt for a system to solve the problem of viscosity control. How the problem was met is described as follows.

A view of the vehicle loading bays where 14 road tankers can be loaded simultaneously



The four large in-line fuel oil blending units at the terminal were manufactured by Fisher Governor Company Ltd, a member of the Elliott-Automation Group. The installation enables varying grades of fuel oil to be supplied to loading arms for road and rail tankers and maintains the specification of the oil to within ± 1 per cent of the desired viscosity, an accuracy which it is claimed has not previously been achieved by commercial distributing installations in Britain.

The design of the blending units uses the principle of parallel metering of two fluid components and the establishment of equal pressures at the point of metering, a method which achieves a high accuracy of blend without the need of an external source of operating power.



The pump slab and in-line blenders. On the left is the settling tank for the adjoining boiler house

To meet Mobil Oil Co's demand for an exceptional degree of accuracy in the blend at an unusually high rate of flow, Fisher developed a modified design of its standard blending unit with 10-in and 6-in heavy and light oil component arms respectively, with a 12-in diameter outlet. To ensure homogeneity of blend at the outlet of the unit and before the measuring point of the controller, a mechanical mixer was installed.

To achieve the additional accuracy of blend required it was decided to fit to each of the Fisher blending units a viscosity control unit, manufactured by Smiths Industrial Instruments. Each unit of the Ellesmere Port installation is now capable of blending oils to produce viscosities of 200–1500 seconds Redwood I in proportions of 97:3 to 60:40, and at flow rates ranging from 0–1400 Imp gal/min to within the overall accuracy required.

Many difficulties have always been associated with viscosity tests in a laboratory. The time taken is lengthy, the test expensive, and the results are often far from precise. In an attempt to overcome these problems, Smiths has produced an apparatus which will constantly test and control the blend while blending is actually in progress. It is said that for the first time it will now be possible to produce, in bulk, fuel oils with viscosities guaranteed to within very fine limits.

The operating principle of the viscosity controller is that by the use of two viscometers, the viscosity of a sample from the blending unit is balanced against the viscosity of a laboratory-prepared reference sample. The viscosities are measured by a rotating cup viscometer, the output torque of which acts upon a balance arm. The viscometers are run in a water bath and are driven at the same speed by an electric motor. The laboratory-tested sample contained in its viscometer is at the temperature of the bath, which is also quickly attained by the other sample as it passes through the heat exchanger immersed in the bath. Thus if the viscosities of the two samples are identical the balance arm will be in a state of equilibrium, which will be altered if there is a change in viscosity of the line product, thereby operating a micro switch or a pneumatic control. The controller has a time response of 25 seconds.

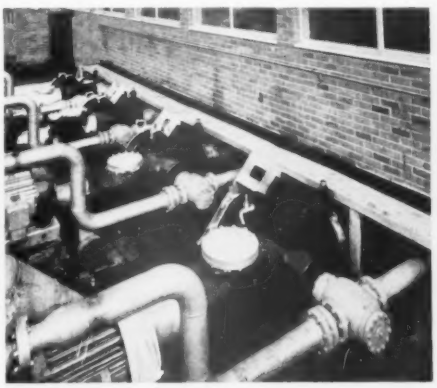
Mobil reports that savings of approximately 3–4 per cent per ton may be achieved on the cost of making a blend, by the use of reduced quantities of higher-cost cutter stock in the blend. Proof of the controller's extreme accuracy is presented by its detection of gas oil in oil samples which was not discovered by chemical laboratory tests.

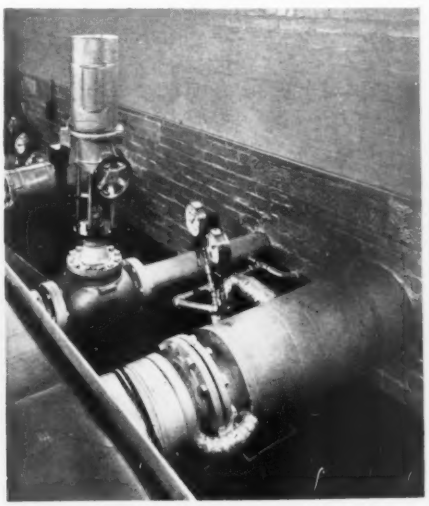
To handle the heavy fuel oil, eight Hamworthy vertical positive displacement electrically-driven screw pumps (type SVF 3800 L3) are mounted in pairs in a line on a concrete base.

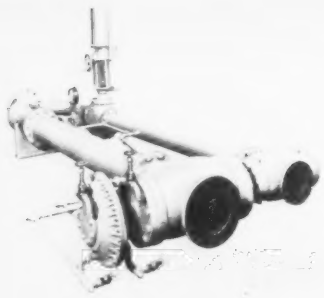
The pumps are designed to handle 550 gal/min of heavy oil viscosity 2250 sec Redwood I at 120 F, with a working pressure of 110 psi, thus giving a total output of 1100 gal/min to each blender when both pumps are brought into operation. They are direct coupled to vertical motors rated at 70 bhp, running at 975 rev/min.

Integral with the pump is a full flow relief valve, with a single gland, and the use of Flexibox mechanical seals. Steam tracing

A general view of the control building (below), *showing the delivery end of the blending units protruding through the walls of the building; and* (right) *two arms of one of the four Fisher Governor blending units. The electrically-operated metering valve can be seen in the light component line*





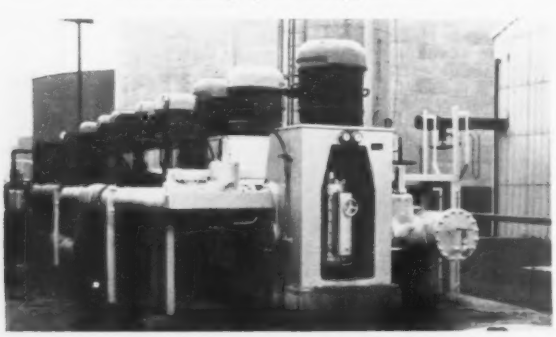


One of the blending units showing inlet valves and balancing diaphragm

has been fitted round the pumps to ease starting in very cold weather.

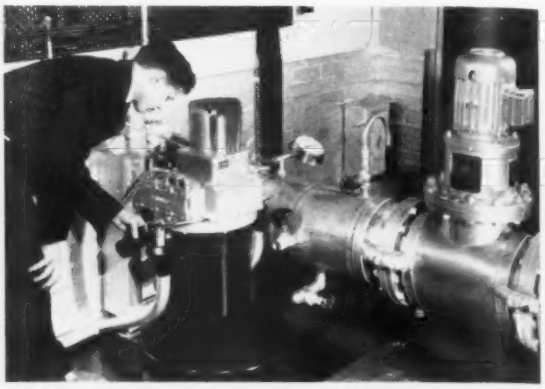
Pump control is fully automatic from pressurized discharge lines. The opening of a discharge valve at the loading points automatically starts the first pump on the respective blender in use, and when the pressure decreases beyond a determined point on opening further valves, the second pump on the blender is automatically brought into operation. Conversely, as the demand decreases the pressure increases and the pump stops in sequence.

The Hamworthy vertical screw pumps type SVF 3800 L3, for the handling of the heavy fuel oil



In addition, two Hamworthy SHA 75 L3 small horizontal positive displacement screw pumps transfer the boiler fuel oil from the storage tank to the daily service tank. These are arranged in tandem, one running and one standby. Each delivers 87 gal/min of 3500 sec Redwood I fuel oil at 100 F, at a discharge pressure of 35 psi when running at 960 rev/min.

Distribution of all products from the terminal is by road,



An overflow sample is collected from a Smiths' viscosity controller

rail, and sea, and represents an important addition to Mobil Oil Co's distribution facilities in the densely-populated areas of Cheshire, Lancashire, and Yorkshire. The area contains 20 per cent of total U.K. population and accounts for nearly 20 per cent of the country's consumption of petroleum products. Industrial and domestic Mobil fuel oils are being marketed by Charrington, Gardner, Locket & Co. Ltd.

Main contractors for the terminal were John Laing and Son Ltd, being associated with The H. K. Ferguson Co. of Great Britain for the electrical and mechanical work.

* * *

Aramco Operations in 1959

The 1959 *Report of Operations to the Saudi Arab Government by the Arabian American Oil Company* presents the record of its achievements during the year, bi-lingually, and with admirable use of both coloured and black-and-white photographs, together with maps of the country.

Production of crude oil during 1959 rose by 7·9 per cent over the preceding year, reaching a total of 399,820,590 brl compared with 370,485,754 brl. On 27 March a record day's production for Aramco of 1,351,484 brl was achieved, and at the end of 1959 the Company had 201 producing oilwells—nine more than at the end of 1958.

The share of the various fields in the crude oil production total was as follows:

	bd
Ghawar	701,845
Abqaiq	267,314
Safaniya	76,176
Dammam	34,054
Qatif	16,002

Oil exploration activity continued over many widely-separated parts of the Company's concessions. Once again, however, most of the effort was concentrated in the southern and western sections of the Rub'al-Khali. Structure drill crews were engaged in the mapping of the regional structure on the shallow horizons in the western section, and in the southern area some structure stratigraphic holes were rotary drilled. Seismograph crews covered parts of the south-west and engaged in a preliminary reconnaisance in the difficult Sand Mountain region of the eastern Rub'al-Khali.

Drilling operations during the year disclosed additional reserves exceeding the amount withdrawn in 1959 by about 2000 million brl. The Company's proved recoverable reserves at the end of the year were estimated at about 38,600 million brl. During 1959 22 deep wells were completed, including three offshore in the Manifa field.

In the Fazran area of the Ghawar field, one oilwell and two observation wells were completed. The area is now reported

to be about 20 km long and 3 km wide, but the structure has not yet been defined on the north-east.

In the Khurais field, 6 development wells and one observation well were completed. The deep test at Khurais No. 4 was plugged back at 13,560 ft after extensive coring and testing proved the Khuff formation unproductive. It is completed for production in the Arab-D member. Indications are that the Khurais field is about 50 km long and 13 km wide.

Although the extent of the offshore field at Manifa has not yet been determined the Manifa zone oil accumulation is at least 22 km in length. Delineation drilling continued there during the year, and Manifa No. 6 was being drilled at the year end. Sufficient capacity has been developed in the Khursaniyah field to put it into production in 1960. It is about 11 km long and 7 km wide, and initial crude capacity will be 45,000 bd.

The Khursaniyah pump station, which was completed in 1958, will allow up to 190,000 bd of either Khursaniyah or Safaniya crude oil to be moved to Ras Tanura through the 22-in Safaniya-Ras Tanura pipeline. The 'Ain Dar gas injection plant, the largest in the Middle East, came into operation in February, and by the end of the year was injecting high-pressure gas into the 'Ain Dar structure of the Ghawar field at a rate of more than 160 million cu ft day.

Construction is to commence in 1960 of a plant at Abqaiq for the injection of some 37,000 bd of LPG into the 'Ain Dar reservoir. The plant is designed to process 55 million cu ft day of heavier low pressure petroleum gases now being flared. When this LPG programme begins in 1961 it is expected that Aramco will be using about 73 per cent of all natural gas for reservoir pressure maintenance, for fuel, and for other industrial purposes.

The Ras Tanura refinery processed a total of 63,609,799 brl of crude oil during 1959—3·7 per cent more than in the previous year. Refinery production was 63,309,168 brl, an increase of 2,544,326 brl. The new alkylation plant commenced operation in June, capacity of the asphalt plant was increased and modified for the simultaneous production of two grades, and a new plant begun in 1959 for the production of some 4000 bd of refrigerated LPG for offshore sale will be the first of its kind in the world.

In the preface summary of the highlights of the *Report* from the board of Aramco, the world-wide surplus of oil-producing capacity is mentioned and it is remarked that substantial quantities of oil from North Africa would soon enter markets now served with Middle East oil. It draws forth the comment that "These economic circumstances in the oil industry require that every effort be made by the Company and His Majesty's Government to improve the competitive position of Aramco's production".

World Tanker Statistics First Quarter 1960

During the first quarter of 1960 the number of oil tankers under construction in the world totalled 249 ships of 4,652,160 gross tons, according to the recently-published *Lloyds Register Shipbuilding Returns* for that period. This figure was a drop of 218,709 tons compared with the previous quarter, and represented 49·7 per cent of the total tonnage of merchant shipping under construction in the world.

There were 124 steamships of 3,353,032 tons under

TABLE I
OIL TANKERS UNDER CONSTRUCTION AT END MARCH 1960

Country of build	*Steam*		*Motor*		*Total*	
	No.	*Tons gross*	*No.*	*Tons gross*	*No.*	*Tons gross*
Great Britain & Northern Ireland ...	28	715,820	27	247,406	55	990,226
Other Commonwealth Countries ...	2	47,900	—	—	2	47,900
Argentina ...	—	—	3	4,600	3	4,600
Belgium ...	1	30,000	2	26,200	3	56,200
Denmark ...	3	78,800	7	94,100	10	172,900
Finland ...	—	—	2	5,930	2	5,930
Formosa ...	1	20,500	—	—	1	20,500
France ...	8	257,370	4	58,984	12	316,354
W. Germany...	12	328,738	9	74,313	21	403,051
Greece ...	—	—	1	16,270	1	16,270
Italy ...	18	444,900	7	25,770	25	470,670
Japan ...	11	368,540	9	27,820	20	396,360
Netherlands ...	11	281,863	11	137,600	22	419,463
Norway ...	—	—	11	155,829	11	155,829
Poland ...	—	—	2	25,200	2	25,200
Portugal ...	1	17,560	2	1,540	3	19,100
Spain ...	3	64,247	11	105,114	14	169,361
Sweden ...	8	239,630	12	222,084	20	461,714
U.S.A. ...	14	404,564	—	—	14	404,564
Yugoslavia ...	3	52,600	5	43,368	8	95,968
World total	124	3,353,032	125	1,299,128	249	4,652,160

TABLE II
OIL TANKERS LAUNCHED DURING THE FIRST QUARTER 1960

Country of build	*Steam*		*Motor*		*Total*	
	No.	*Tons gross*	*No.*	*Tons gross*	*No.*	*Tons gross*
Great Britain & Northern Ireland ...	3	83,740	6	50,085	9	133,825
Other Commonwealth Countries ...	—	—	—	—	—	—
Belgium ...	—	—	1	13,200	1	13,200
Denmark ...	—	—	2	23,700	2	23,700
Finland ...	—	—	1	2,600	1	2,600
France ...	—	—	1	31,147	1	31,147
W. Germany...	3	73,425	3	16,278	6	89,703
Italy ...	3	72,000	1	600	4	72,600
Japan ...	6	155,350	22	6,490	28	161,840
Netherlands ...	3	62,601	3	14,400	6	77,001
Norway ...	—	—	—	—	—	—
Poland ...	—	—	—	—	—	—
Portugal ...	—	—	—	—	—	—
Spain ...	—	—	2	26,214	2	26,214
Sweden ...	1	24,000	4	51,054	5	75,054
U.S.A. ...	1	31,000	—	—	1	31,000
Yugoslavia ...	—	—	—	—	—	—
World total	20	502,116	46	235,768	66	737,884

TABLE III

REGISTRATION OF OIL TANKERS UNDER CONSTRUCTION
AT END MARCH 1960

Country of registration	*No.*	*Gross tonnage*	*Country of build*	*No.*	*Gross tonnage*
Britain ...	60	1,110,766	Britain ...	49	872,126
			Commonwealth	1	21,000
			Belgium ...	1	13,200
			W. Germany ...	3	60,640
			Italy	4	92,800
			Japan ...	1	30,000
			Netherlands ...	1	21,000
Canada ...	1	26,900	Commonwealth	1	26,900
Other Commonwealth	3	105,700	Britain ...	1	18,200
			Japan ...	1	57,500
			Sweden ...	1	30,000
Argentina ...	3	4,600	Unspecified ...	3	4,600
Belgium ...	1	31,700	W. Germany ...	1	31,700
Brazil ...	4	43,400	Denmark ...	3	21,600
			Japan ...	1	21,800
Denmark ...	6	113,000	Belgium ...	1	13,000
			Denmark ...	5	100,000
Egypt (UAR)	2	27,000	W. Germany ...	2	27,000
Finland ...	2	14,600	Finland ...	1	2,600
			Netherlands ...	1	12,000
France ...	11	259,854	Denmark ...	1	21,500
			France ...	10	238,354
W. Germany	4	57,700	W. Germany	4	57,700
Greece ...	4	62,506	Netherlands ...	3	46,236
			Unspecified ...	1	16,270
Iran ...	1	33,000	France ...	1	33,000
Italy ...	17	321,270	Italy	17	321,270
Japan ...	10	56,720	Japan	10	56,720
Liberia ...	18	538,123	France ...	1	45,000
			W. Germany ...	2	51,713
			Italy	1	22,000
			Japan ...	4	153,190
Liberia—*cont.*			Netherlands ...	1	32,000
			Sweden ...	4	116,400
			U.S.A. ...	3	84,052
			Yugoslavia ...	1	13,268
			Unspecified ...	1	20,500
Netherlands ...	16	288,226	Belgium ...	1	30,000
			W. Germany ...	1	499
			Netherlands ...	14	257,727
Norway ...	27	497,089	Britain ...	4	77,900
			W. Germany ...	6	157,400
			Netherlands ...	1	500
			Norway ...	11	155,829
			Sweden ...	5	105,460
Panama ...	5	112,150	Italy	2	34,000
			Japan ...	2	54,150
			Sweden ...	1	24,000
Poland ...	3	38,700	Poland ...	2	25,200
			Yugoslavia ...	1	13,500
Portugal ...	3	19,100	Unspecified ...	3	19,100
Russia (USSR)	1	3,330	Finland ...	1	3,330
Spain ...	14	169,361	Spain	14	169,361
Sweden ...	8	159,229	Sweden ...	8	159,229
U.S.A. ...	16	443,637	Denmark ...	1	29,800
			W. Germany ...	1	16,100
			Italy	1	600
			Netherlands ...	1	50,000
			Sweden ...	1	26,625
			U.S.A. ...	11	320,512
Venezuela ...	2	45,000	Britain ...	1	22,000
			Japan ...	1	23,000
Yugoslavia ...	5	52,900	Yugoslavia ...	5	52,900
Unspecified ...	2	16,599	W. Germany ...	1	299
			Yugoslavia ...	1	16,300

Of the 249 oil tankers under construction totalling 4,652,160 gross tons, 169 of 2,856,398 are for registration in country of build.

construction compared with a total of 125 motorships of 1,299,128 tons. The greatest decline compared with the previous quarter was in the motorship category.

In Britain, 55 tankers of 990,226 gross tons were being built at the end of the quarter. This was 3430 tons more than at the end of 1959, and represented 50·5 per cent of the total tonnage under construction in the country.

Britain was one of the few nations to increase its tonnage of tanker registrations compared with the previous quarter. Its 60 ships of 1,110,766 gross tons contrasted with the 18 vessels of 538,123 tons for register in Liberia; Norway's 27 of 497,089; and the U.S.A.'s 16 vessels of 443,637 (this also being an increase). Full details can be seen in Table III.

In the list of countries in which tankers were built Britain has maintained its ascendancy, but Japan, which has held second place for every quarter of the last twelve months in the quantity of tonnage built, has fallen to seventh position with 20 vessels of 396,360 tons. Second place is taken by Italy's 25 tankers of 470,670 tons, followed by Sweden with 20 of 461,714, and the Netherlands with 22 of 419,463. Table I gives details of tankers under construction, their country of build, and type of propelling machinery.

During the first quarter of 1960 Britain commenced 6 tankers, launched 9, and completed 11. Japan commenced 21, launched 28, and completed 35. Germany commenced 8, launched 6, and completed 7. Sweden commenced 4, launched 5, and completed 9. Details of launchings appear in Table II.

Fuel Efficiency and Power for Industry

The 1960 Fuel Efficiency and Power for Industry Exhibition was held on 27 April–6 May at Olympia, London. In his opening speech, Sir Dennis Proctor, K.C.B., permanent secretary of the Ministry of Power, said that the history of fuel efficiency, like the history of the exhibitions themselves, was a story of continuous expansion. Great efforts had been made by all those concerned in the fuel and power industries to promote ever greater efficiency. The series of Fuel Efficiency and Power for Industry Exhibitions was one of the principal shop windows of these efforts.

In quoting some of the actual results gained by fuel efficiency over the last few years the speaker reported that although the level of industrial activity remained very much the same over the three years 1955-58, the annual consumption of coal by industry fell by about 8½ million tons. Of this reduction it was estimated that about 3 million tons was due to the growth in the use of oil, and the remainder—about 5½ million tons or nearly two-thirds—was due to other causes of which the biggest was the steady improvement in fuel efficiency.

It was further said that where an industrial case had been the subject of special heat and power surveys by NIFES, the average improvement of fuel efficiency afterwards had been of the order of 20 per cent.

The series of exhibitions began in Manchester 10 years ago, and after three years there the venue had been shifted to the National Hall in Olympia. Under the impetus of constant expansion the exhibition was this year moved to the Grand Hall, which has double the space of its neighbour.

The following are some of the firms which exhibited at the 1960 Exhibition, with particulars of their products. Further information should be obtained from the companies concerned.

Auto Combustions (London) Ltd, 360–364 Wandsworth Road, London, S.W.8.
Portable injector equipment for oil firing top-fired continuous Hoffman kilns and side-fired Belgian kilns. *Swirlamiser* medium pressure air atomizers for applications up to 10 million Btu/hr.

Auto-Klean Strainers Ltd, Lascar Works, Staines Road, Hounslow, Middlesex.
Filters for oil burning applications varying in size from the small domestic central heating equipment to large furnace, boiler, and oil refinery installations. Also a range of filters for high-pressure fuel oil service for pressures up to 1000 psi.

Bastian & Allen Ltd, Ferndale Terrace, Harrow, Middlesex.
B. & A. Hynes type tubular heating elements for the heating of oil, water, chemicals, and all other fluids. These can be used for tanks up to 45 ft long, and as the element is placed inside its housing it is easily withdrawable without disturbing the vessel contents.

The British Steam Specialities Ltd, Fleet Street, Leicester.
A range of ancillary equipment for solid fuel and oil-fired heating systems, including tank contents gauges for remote readings, oil filters, pressure gauges, etc.

The Cape Asbestos Co. Ltd, 114 & 116 Park Street, London, W.1.
Various thermal insulation materials used by marine and industrial undertakings all over the world. *Caposite* amosite asbestos moulded blocks and pipe sections, and *Rocksil* rock wool for use in rigid pipe sections, resin-bonded slabs and mattresses.

The Carborundum Co. Ltd, Trafford Park, Manchester 17.
Super refractory materials in silicon carbide and fused alumina designed to withstand high temperatures and resist abrasion under arduous conditions. The display covers bricks, tiles, kiln furniture, tubes, and muffles.

Charringtons Ltd, Tower House, Trinity Square, London, E.C.3.
Four-in-one plan for house heating with Mobil fuel oils. Descriptive booklets on *Steam and Hot-Water Boiler Testing* and *the Use and Storage of Fuel Oils*. Types and sizes of boilers are described, their applications, and details of boiler controls, oil storage, etc, are provided.

Cochran & Co. Annan Ltd, Newbie Works, Annan, Dumfriesshire.
A new *Sinupac* horizontal boiler rated at 3750 lb steam/hr at 212 F, suitable for firing with either oil or solid fuel; and the Series 11 vertical boiler which contains various modified features, and is rated at 1750 lb steam/hr at 212 F, designed for a working pressure of 100 psi.

Colt Ventilation Ltd, Langley Road, Surbiton, Surrey.
A range of oil-fired turbo-static air heaters with a new method of combustion which utilizes a combustion unit incorporating integrally the burner air supply and combustion chamber. Combustion is clean and the amount of excess air required is reduced to a minimum.

W. H. Cooke (Romford) Ltd. Hog Hill Road, Collier Row, Romford, Essex.
The Essex general purpose incinerator, for disposing of a wide variety of waste, and combustion chamber linings for oil firing equipment.

Cradley Boiler Co. Ltd, Cradley Heath, Staffordshire.
Triple-Pass fully automatic oil-fired packaged *Steampacket* boilers which permit rapid steam-raising by the avoidance of excessive rigidity, and employing separate rear tube plates.

Edwin Danks & Co. (Oldbury) Ltd, Babcock & Wilcox Ltd, Babcock House, 209 Euston Road, N.W.1.
Symmetriflo oil-fired shell-type hot-water boiler for higher pressure installations; the Danks-Simmon *Rotecon* rotating economizer, which is self-contained and can be installed at any convenient point on the main flue between the boiler and chimney; and *Quickseal* doors for use on pressure vessels, with both clamp-type and rotating locking ring varieties.

Esso Petroleum Co. Ltd, 36 Queen Anne's Gate, London, S.W.1.
Advice on the installation and use of oil burning and storage equipment for all types of industry, as well as the Company's plan for domestic oil-fired central heating. Booklets available on these subjects.

Ether Ltd, Tyburn Road, Birmingham 24.
Transistorized flame controllers, types 450, 451, and 452, which are suitable for use with gas or oil flames. Automatic opening and manually-operated solenoid valves.

Gilbarco Ltd, 740 High Road, London, N.17.
A new range of remote and semi-remote integrating, indicating, and recording equipment, designed for use on fuel oil (and other) installations. Includes all types of units from a simple single-bank totalizing integrator to a combined rate of flow indicating, quantity integrating, and rate of flow charting unit.

James Gordon & Co. Ltd, Dalston Gardens, Stanmore, Middlesex.
Automatic combustion controllers for oil-fired boilers; reducing, overflow, and relief valves; liquid level and pressure recorders and indicators; and gas analysis equipment.

Hamworthy Engineering Ltd, Fleets Corner, Poole, Dorset.
Forced draught rotary oil burner operating on the rotary cup atomizing principle; combination gas and oil rotary burners; 14 and 24-in pressure jet register burners; and screw and turbine-type pumps.

J. Hickey & Sons Ltd, Great Cambridge Road, Cheshunt, Herts.
The corner tube steam boiler, in sizes up to 1500 lb evaporation, for a working pressure of 250 psi. A fully automatic oil-fired unit.

Honeywell Controls Ltd, Ruislip Road East, Greenford, Middlesex
Complete range of pneumatic controls for air-conditioning, components for air balance control of double duct air conditioning systems. Transistorized panels for electronic control systems. Electronic two position and modulating humidity controls. Indoor and outdoor central heating thermostats, and the *Ultra-Vision* flame detector for exclusive sensing of ultra-violet light.

W. C. Holmes & Co. Ltd, Turnbridge, Huddersfield.
Installation of LPG plant. Electrical precipitators for removal of micron and sub-micron liquid and solid particulate matter from all types of carrier gases. Holmes-Rothemuhle multi-cell cyclone dust collectors and Holmes-Retroflux bag filters for countering heavily dust-laden gases. Holmes-Kemp totally-enclosed solid desiccant type dryers.

Johnson & Starley Ltd, Bedford Road, Northampton.
Range of oil-fired space heaters with outputs of 34,000–125,000 Btu/hr. For the firing of these heaters the *Kresky* forced draught vaporizing burner is available in sizes of 30,000–250,000 Btu/hr, also shown as a suitable conversion unit for domestic boilers.

Kelvin & Hughes (Industrial) Ltd, Kelvin House, Wembley Park Drive, Wembley, Middlesex.
Simulator unit featured demonstrating the practical operation of automatic boiler control equipment. Increases in boiler efficiencies of over 6 per cent achieved, and installation costs recovered within 3-6 months of operation. Controls are operated either manually or automatically. Other items included flue gas analysis, indicating ,and recording instruments, a low-cost smoke detection system, and a range of indicating controllers.

The Marley Tile Co. Ltd, Riverhead, Sevenoaks, Kent.
Marleycel expanded polystyrene made by The Shell Chemical Co. Ltd, and developed by Marley for the building industry. In board form, it possesses high thermal insulation properties and is resistant to alkalis, diluted acids, water and water-vapour, and oxygen.

Marshall Sons & Co. Ltd, Britannia Works, Gainsborough.
The Marshall P.20 fully-automatic packaged oil-fired hot water heater with an output of 670,000 Btu/hr, and other oil-packaged boilers.

Metro-Flex Group of Companies, 47 Whitechapel High Street, London, E.1.
Thermal storage system enabling any boiler to be used as a heat accumulator. This is incorporated into the Metro-Flex oil-firing system which comprises a complete installation, including burners. It is particularly suitable for handling fluctuating or low-load running.

Newalls Insulation Co. Ltd, Washington, Co. Durham.
Insulants such as 85 per cent magnesia, *Newtempheit*, asbestos, and their new product *Newtherm* calcium silicate insulation for land and marine applications. *Paxtile* material, with special plastic facing and design perforation for heat conservation and acoustic correction.

Newton Chambers & Co. Ltd, Thorncliffe, Nr Sheffield.
Redfyre corner tube boiler for steam and high-pressure hot water, and the newly-launched *Redfyre Centramatic* oil-fired water heaters and boilers. Licensed manufacturing of the Struthers Wells oil-fired heater for heating oil and organic fluids, cracking hydrocarbon liquids and gases, chemical fluids, etc.

Nu-Way Heating Plants Ltd, Vines Lane, Droitwich, Worcestershire.
Automatic oil burner model ZL.2. designed for incorporation as standard equipment on domestic oil-fired boilers and air heaters. Equipped for either flange or pedestal mounting, and incorporating standard burner components and a totally-enclosed motor.

Photoelectronics (M.O.M.) Ltd, Oldfields Trading Estate, Oldfields Road, Sutton, Surrey.
A range of automatic sequence and flame failure controls for all types of oil burners. Photoelectronic smoke alarms and smoke density indicators for any size of installation.

Thomas Potterton Ltd, Cavendish Works, 20–30 Buckhold Road, London, S.W.18.
A range of oil-fired boilers from the Potterton BOA 60 of 60,000 Btu/hr to the FOA series of up to 1 million Btu/hr.

Redheugh De Poray Boilers Ltd, 49 St James's Street, London, S.W.1.
Vertical water tube boilers suitable for either solid fuel or oil firings, of welded construction and X-ray and stress relieved, and of sizes 600–5000 lb steam/hr. Wiggins-type floating roof and seal for prevention of vaporization in refinery and storage depots.

The Rheostatic Co. Ltd, Farnham Road, Slough, Bucks.
Satchwell DG oil burner control—a small automatic control unit which employs a photo-conductive cell for flame detection. This is suitable for building into small oil burners. Duotronic proportional plus integral electronic control.

Rubery, Owen & Co. Ltd, Church Street, Wednesbury, Staffs.
The new *Easifire* Model 80 and Model 100 oil-fired boilers, designed to provide central heating and domestic hot water of unlimited quantities without the use of storage cylinder or calorifier. Burner range of 30,000–700,000 Btu/hr. Also air and space heaters.

Ruston & Hornsby Ltd, Lincoln, Lincolnshire.
The horizontal *Thermax* oil or solid-fuel fired boilers, having diameters of 5–12 ft and lengths of 9–15 ft, with evaporations of 1200–17,500 lb/hr. Requires little brickwork and affords simple and speedy installation. Also the Ruston 6YE generator set, which, for a 50-cycle operation, has a rating of 48–75 kW at 1000–1500 rev/min.

Shell-Mex and B.P. Ltd, Shell-Mex House, London, W.C.2.
Advice on the installation and use of oil burning and storage equipment for industrial and domestic uses. Showing of the film *The Advancing Flame* (reviewed elsewhere in this issue).

Shell-Mex and B.P. Gases Ltd, Cecil Chambers, 76–86 Strand, London, W.C.2.
Display of rotary retort furnace and large burner assembly units using liquefied petroleum gases in industry. Showing of a film on the uses of LPG.

Swinney Bros. Ltd, Morpeth, Northumberland.
The Swinney-Enterprise forced draught rotary oil burner, fully automatic and suitable for application to all types of steam raising and hot water boilers. Available in a range of 12 sizes covering outputs of 41–66 gallons/hr. Also Moduflame self-proportioning burners of low air pressure with single lever control of both fuel rate and combustion air.

John I. Thornycroft & Co. Ltd, Thornycroft House, Smith Square, London, S.W.1.
Oil fuel pumping and heating unit of duplex pattern, suitable for an industrial boiler house. Fuel output of 1500 lb/hr at 325 psi maximum, and comprising 2 electric fuel pumps, electric heater, steam oil fuel heaters, and filters.

Trier Bros. "Collgraf" Ltd, Cumberland Works, New Church Road, London, S.E.5.
Equipment for the *Collgraf* oil-free lubrication system for steam plant. Boiler treatment for scale prevention and for the inhibition of corrosion and caustic embrittlement in hot water systems. *Collgraf* lubrication for dies and matrices eliminating noxious fumes and carbon deposits.

Ronald Trist & Co. Ltd, Bath Road, Slough, Bucks.
The *Electricon* smoke alarm type ASB which gives warning that the smoke emitting from a chimney has exceeded a predetermined maximum permissable limit. Magnetic liquid level control switches, and safety switches.

Books and Films

Oceanography and Oil

Oceanography is a science which can and will play an important part in the future search for petroleum and, in writing *Under the Deep Oceans**, Dr T. F. Gaskell has done a considerable service to the oil industry in pointing the way. Basically an account of the voyage of *HMS Challenger* during its world-wide oceanographic expedition in 1949–52, of which Tom Gaskell was chief scientist, the book also shows how a study of the rocks underlying the sea bed can serve the oil industry in many ways. Not only can it provide valuable data to improve the understanding of the conditions under which oil was formed and conserved, but it can also be of considerable practical use in some every-day activities of the industry. Thus, the study of waves and sea currents can have its impact on the design of offshore drilling structures and jetties, and in the laying of pipelines under water.

Supporting the plea for the drilling of a hole to the Mohorovicic discontinuity, Dr Gaskell says "there is no doubt that the proper people to sponsor the project are the oil companies, since they would undoubtedly benefit in the long run from the lessons learned in attempting to drill deeper into the Earth".

Dr Gaskell has succeeded in combining science, travel, and some humour in an extremely fascinating and readable book. The three years on *Challenger* were apparently not without their compensations during rest periods, and occasional references to off-duty entertainment and events provide refreshing interludes. The author is well-known as a broadcaster on science topics and is the Research Associate for the Exploration Department of The British Petroleum Company. He is also a recently-elected Member of Council of the Institute.

* "Under the Deep Oceans". T. F. Gaskell. London: Eyre & Spottiswoode, 1960. Pp. 240. 25s.

Canadian Oil and Gas

The 1960 edition of the *Survey of Oils*, published by the *Financial Post*, 481 University Avenue, Toronto 2, and obtainable at a price of $4, is once again a complete compendium of important facts and figures on the Canadian oil industry.

The largest section of this publication is a 160-page directory of oil and gas companies. Production statistics, financial information, and details of its various properties and interests are supplied for each company.

In addition a large statistical section presents data on imports, exports, consumption, production, and reserves of petroleum and natural gas. Lists of oil and natural gas fields in each province are provided, with details of gas reserves by fields, and there is a table of crude oil and processing plant capacities of each of the Canadian refineries. The section concludes with a review of price ranges of Canadian oil and gas stocks for the last few years.

An extremely useful map selection shows Canadian oil and gas pipelines and large-scale presentation of fields and concession holdings in the western provinces.

Directory of Scientific Instruments

What is said to be the most comprehensive list of British scientific instrument manufacturers and their products yet compiled is provided by the 1960 edition of *British Instruments*. Published by the United Science Press Ltd under the authority of the Scientific Instrument Manufacturers' Association of Great Britain the publication is the result of the 1959 amalgamation of the *Instrument Directory and Buyers' Guide*, published by United Trade Press, and *British Scientific Instruments*, published by SIMA.

The whole of the British scientific instrument industry, irrespective of Association membership, is included within the pages of this publication. The edition has expanded to a total of 635 pages, and includes classified lists of instruments and components, trade names, manufacturers' reference sheets, allied associations, BSI specifications for scientific instruments, and foreign glossaries in French, German, and Spanish.

British Instruments is obtainable from the Scientific Instrument Manufacturers' of Great Britain, SIMA House, 20 Queen Anne Street London, W.1., price £2 5s post free.

Electrical Apparatus as a Cause of Fire

An important technical information sheet on *Motors, Transformers, and Switchgear as a Cause of Fire* has been produced by the Fire Protection Association.

The pamphlet points out that the reliability of electrical apparatus may be seriously impaired if the apparatus is exposed to a change of conditions under which, for example, the load is increased, ventilation impeded, or a higher temperature imposed. The consequence of this is to raise the temperature of the apparatus, thus shortening the life of the insulation, whilst the presence of dust, corrosive liquids or vapours, or undue amounts of moisture may also precipitate breakdown.

The different troubles which may beset the various items of electrical equipment are then outlined, together with the sort of inspection and maintenance which is required. The information sheet is obtainable from the Association, at 31–45 Gresham Street, London, E.C.2.

Steel and Coal-Chemicals

In the short space of 37 minutes the viewer of *Stone into Steel* is taken on an extensive tour of the Appleby-Frodingham Steel Company's works at Scunthorpe where 11,000 people produce 1·4 million tons of steel a year. It seems that every operation from unloading the iron ore to the checking of a finished plate is illustrated. The only spoken commentary is a brief introduction, after which the many contrasting and often dramatic sequences, and a specially-composed musical score, tell the story. Produced in Eastmancolor by Frank Bundy, the photography by cameraman Ralph Larrabeiti is excellent, and one can almost feel heat radiating from shots of furnaces, ingots of molten metal, and billets being rolled and re-rolled.

Stone into Steel is an excellent film, the only criticism being that at times the actual noise of the steelworks themselves might have been more fitting than some of the artificial sounds emanating from the sound track. There is also one extremely macabre shot, the purpose of which was so far from understandable that it could be removed without spoiling the story.

One of the materials used in large quantities by the Appleby-Frodingham Company is metallurgical coke. This is produced in the Sheffield works of United Coke and Chemicals Co. Ltd and, in *Out of the Forest*, a 30-minute Eastmancolor film, some of the range of chemical products which are also obtained during the carbonization of coal are illustrated. The film takes the form of a conducted tour through the plant and a description of the processes by which coal-based chemicals are

A third-hand melter at Appleby melting shop replaces honest sweat with a refreshing draught—of tea

produced. The end-uses of these products are also illustrated.

Both films, as well as others concerned with steelmaking, are available on free loan, in 16 and 35 mm format, from the Public Relations Officer, The United Steel Companies Ltd, The Mount, Broomhill, Sheffield 10.

Petroleum in Parliament

The Gas Bill

During the second reading of the Gas Bill on 8 March Frederick Lee (Newton) said that the time had come for the Government to examine methods used by international oil companies in marketing their products. He further remarked that he had been told by private coal owners in Germany that oil was sold there at a price well below that asked outside Germany—that even if a tax of DM 30 per ton were imposed on oil it would only bring the price to that now obtained in other parts of the world. Competition was said to be based not on economics but on the international ramifications of oil company movements whereby a market would be picked and prices reduced well below the economic price, being subsidized by the upward movement of prices in other parts of the world in which they were operating.

Mr Lee continued that he could see no reason why such a situation should not happen in Britain. He suggested that "an expert committee should be set up which is capable of analysing the ramifications of the international oil companies. I would tax very heavily fuel oil which is imported as fuel oil."

J. H. Osborn (Sheffield, Hallam) said that the consumer should be informed that "the known oil reserves in the world could be seriously depleted by the turn of the century . . . but the coal reserves of this country could last us for 500 years."

Domestic Heaters

In a reply to a question on 17 March the Secretary of State for Home Affairs said in a written answer that the number of fires in the home caused by oil, gas, and electric heaters respectively, in Great Britain in 1958 were:

Oil	2128
Gas	84
Electric ...	928

Natural Gas Supplies

In the course of further stages of the Gas Bill, Frederick Lee (Newton) asserted that he recently heard an expert discussing world fuel supplies assess the amount, and the life, of natural gases as "very short indeed". He said that such experts believed that the exhaustion of world supplies of natural gas was "going ahead at a very great pace", and it would therefore be a mistake to base future planning development within the gas industry on a type of fuel which might soon not be available.

Hydrocarbon Oils in the Budget

In his budget statement on 4 April the Chancellor of the Exchequer announced that he proposed to make a change in administrative control of the hydrocarbon oil duty in so far as it affected heavy oils used in road vehicles.

Details of these minor changes were published in the White Paper, and were as follows:

"It is proposed to take power to require the addition of chemical markers to duty-free heavy oils in order to facilitate the control of such oils".

Power Stations

The Minister of Power said in a written answer on 8 April that a list of the 238 power stations in service on 31 March 1959, with the type of plant in each case, had been given in Appendix I of the First Annual Report of the Central Electricity Generating Board. The following changes had taken place since that date:

Stations using coal	*Stations using oil*
Closed:	
Barrow	Birkdale (internal combustion engine)
Blackpool	Horden (waste heat oil)
Dunston A	
Exeter	
Great Yarmouth	
Greenhill	
Harrogate	
Kingston A	
Nelson	
Brought into service:	
Aberthaw	Belvedere
Elland	
High Marnham	
Northfleet	

Stations shown as having oil-fired plant were at present using oil, as were the internal combustion engine and gas turbine stations. The remaining steam stations were using coal or, in a few cases, coke breeze.

Scottish Petroleum Consumption

The Minister of Power told the House in an oral answer on 11 April that deliveries of fuel oil in Scotland rose by 108 per cent between 1955–59, compared with 160 per cent in the rest of Great Britain. Scotland's share in British fuel oil consumption fell from $6\frac{3}{4}$ to $5\frac{1}{2}$ per cent between these years.

In two written answers on the same day the Parliamentary Secretary to the Ministry of Power reported that the Scottish share of the total throughput of U.K. oil refineries in 1949 and 1959 was 15 and 7 per cent respectively. Use of liquid fuels for burning by the larger industrial consumers in Scotland was 140,000 tons in 1949 and 590,000 tons in 1959, whilst the British figure had risen from 2·2 million tons to 7·3 million tons in the same period. Scotland's share of the British total had increased from 6·4 to 8·1 per cent.

Trade Literature, etc.

Road Vehicle Lubrication

Road Vehicle Lubrication is the title of a 76-page handbook recently published by Wakefield-Dick Industrial Oils Ltd.

Although bearing the same name as an earlier book last printed in 1956, this is virtually a new publication. Both the text and the many illustrations and supplementary charts and drawings have been extensively revised and brought up-to-date, and the book has been re-set in a new format.

Road Vehicle Lubrication offers a comprehensive guide to the commercial operator of both passenger and goods vehicles on the proper lubrication maintenance of engine, transmission, and final drive. There are also chapters on chassis lubrication, the effects of faulty lubrication, and equipment and oil storage.

Copies of this informative little book are available free on request to Wakefield-Dick Industrial Oils Ltd, Castrol House, Marylebone Road, London, N.W.1.

Foster Wheeler Contract for Danish Refinery

Foster Wheeler Ltd has been awarded the contract for a new refinery for Dansk Veedol A/S, at Kalundborg. It will have an initial crude capacity of 20,000 bd with a possible future throughput of 40,000 bd.

The refinery will include a desalter unit; an atmospheric crude distillation unit, comprising a naphtha splitter and a light straight run gasoline stabilizer; a naphtha hydrodesulphurizer unit; a catalytic reformer; a light straight run gasoline treating unit; a kerosine treating unit; chemical facilities; LPG facilities; a vacuum gas oil hydrodesulphurizer; blending facilities; vacuum distillation unit; and other attendant facilities. Air fin coolers will be used in place of the more conventional water cooling equipment.

Foster Wheeler Ltd is responsible for the contract, which was obtained against strong international competition, but some of the work will be carried out in the offices of its associated companies in Europe.

Drilling Equipment for India

The largest single shipment of oilwell drilling equipment from the United States to India was announced recently. The shipment, which included two trailer-mounted National T-45 drilling rigs, complete with 97-ft masts and power equipment, drill pipe, and 66,800 ft of steel casing, was mostly manufactured by The National Supply Co.

Products of other manufacturers for each rig included three General Motors 12107 diesel engines (two for powering the rig and one for the independent slush pump), a Lee C. Moore mast, and single trailer assembly mounted on Athey tracks to be drawn by a caterpillar tractor.

On arrival at Bombay, India, the material was carried by railroad to the drilling area near Cambay.

New Fieldmaster Well Servicing Hoist

A new model well servicing hoist, known as the Fieldmaster TC, has recently been produced by Woodfield Rochester Ltd, Frindsbury Works, Rochester, Kent. This unit is similar to the Fieldmaster mechanically-driven hoist, but is fitted with hydraulic torque converter to meet specific requirements. The new hoist is complementary to the existing hoist which will still be manufactured in its present form.

The wheelbase has been increased by 16 in and is designed to be produced either with or without telescopic pole mast. The inclusion of a torque converter in the transportation transmission has simplified the control and results in a smooth drive throughout.

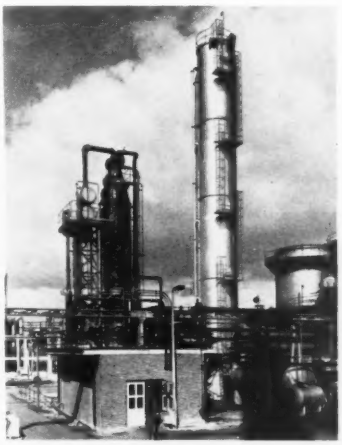
The Fieldmaster TC oilwell servicing outfit for 4000 ft wells

Isle of Grain Gas Plant

The whole of the work involved in the construction of the benzole recovery and desulphurizing plant commissioned at the Isle of Grain Works of the South Eastern Gas Board in November 1959 was carried out by the Chemical Engineering Division of W. C. Holmes & Co. Ltd, PO Box No B7, Turnbridge, Huddersfield.

The plant, which has a daily capacity of 16 million cu ft of gas, operates by the Segas process and is installed immediately after the dry purification plant. It operates on vacuum distillation of the oil which has the merit of maintaining the circulating oil in good condition more or less indefinitely.

An interesting feature is the inclusion of a naphthalene stripping section in the main vacuum still, which deals with the oil from a naphthalene washer on another part of the plant. A further feature is the use of a steam jet vacuum pump as a stand-by to the main rotary vacuum pump.



The Isle of Grain benzole recovery and desulphurization plant

Wakefield-Dick to Lubricate Nuclear Power Station

Wakefield-Dick Industrial Oils Ltd has been nominated by the Central Electricity Generating Board as the supplier of lubricants for the nuclear power station to be erected at Dungeness.

The generating capacity of the station, which is expected to be operational in 1964, will be 500–550 Mw.

Boot Eyelets as Tower Packing

The stainless steel boot eyelets referred to on page 139 of the *IP Review* April 1960 with which The British Petroleum Company Ltd's distillation simulator is packed, are manufactured and supplied by The Hydronyl Syndicate Ltd, 14 Gloucester Road, London, S.W.7.

New Ranges of Dewrance Equipment

A special exhibition of the wide range of products manufactured by Dewrance & Co. Ltd was held recently at the Company's works at Great Dover Street, London, S.E.1. The products on show covered a multitude of services in a wide range of industries. There were three items of equipment which were of particular interest.

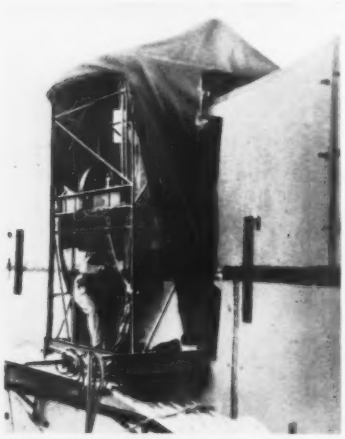
Asco packless solenoid valves are now manufactured in the U.K. by Dewrance under exclusive license from the Automatic Switch Co. of the U.S.A. Designs range from direct acting midget packless 2-way units with $\frac{1}{8}$-in pipe connexions with $\frac{3}{64}$-in orifices, to external pilot-operated units having 6-in diameter ports. Units can handle differential pressures up to 5200 psi, and temperature ranges of from -320 F to 600 F.

Two new ranges of electrical valve actuators have been produced by Jones Tate & Co. Ltd, a division of Dewrance. They are the 100 SD series, spur gear drive, and the WD series, worm gear drive. Together they comprise 10 sizes of units providing valve spindle torques of 30-3500 lb/ft at 24 rev/min. They are available in fully weatherproofed or flame-weatherproof forms, and can be applied to any make or type of valve.

The Dewrance Microsen electronic process control system has been designed for the oil and petrochemical industries. It is of miniature design for panel mounting with individual plug in automatic manual and recorder units. The automatic section of the recording controller uses 2 transistors as an oscillator buffer amplifier and one twin-triode vacuum tube in the feedback amplifier.

Automatic Seam Welding for Storage Tanks

An automatic seam-welding process which, it is claimed, would enable two operators working five hours actual welding time (with an extra 20 man-hours or so for handling and setting up), to complete a specific job which would take four to five operators 300 man hours using orthodox manual welding methods, has been introduced by Rockweld Ltd, Commerce Way, Croydon, Surrey.



The main application of the device, the Circomatic automatic machine seen in the photograph, is for field welding of horizontal girth seams in large storage tanks. It consists of two enclosed platforms straddling the tank wall, and hung from a top carrier. Both sides of the joint are welded simultaneously, using the Rockweld Comet visible arc welding process.

Liquid Fire Extinguishing Agents

Full details of the properties and applications of a new class of vaporizing liquid fire extinguishing agents, entitled dibromodifluoromethane and bromotrifluoromethane, which have been added to the sales range of *Isceon* fluorine chemicals of Consolidated Zinc Corp (Sales) Ltd, 37 Dover Street, London, W.1., are given in a new brochure.

The trade-names of the two agents are respectively *Isceon* 12B2 and *Isceon* 13B1.

New Compound Fertilizers

A new highly-concentrated compound fertilizer to be named *Shell No* 1 has been introduced to the U.K. market by Shell Chemical Company Ltd.

The analysis of the new compound gives a total of 50 per cent plant nutrients—a higher percentage than any other granular compound currently available. While the new fertilizer is particularly suitable for root crops it is also ideal for cereals, fruit, fodder, and horticultural crops.

Castrol Lubrication Charts

Castrol lubrication charts for the MG Magnette Mk III, the Wolseley Fifteen-Sixty, the new Ford Anglia and Prefect, and the Riley Four-Sixty Eight have just been published.

Copies of these charts, printed in two colours and measuring 22 × 17 in, are available free on application to Castrol Chart Library, Castrol House, Marylebone Road, London, N.W.1.

Diesel Engine for Flame-Proofed Equipment

A new three-cylinder diesel engine suitable for installation in flame-proofed vehicles and industrial equipment is announced by Perkins Engines Ltd, Peterborough.

Known as the Perkins Three 152 (Flame-proofed), it has a capacity of 152 cu in and has a number of special features for flame-proof operation, including a water-jacketed exhaust manifold to cool exhaust gases, special cylinder head, gasket, and cylinder head fixing stud holes machined to comply with "Buxton certificate" requirements; specially wide joint facings on the cylinder head for mounting the induction flame trap; and fuel atomizer seatings arranged to conform with flame-proofing regulations.

Air and Gas Drying Equipment

A leaflet dealing with the standard fully automatic Humidryer air and gas drying equipment, produced by Burnett & Lewis Ltd, Redhouse Industrial Estate, Aldridge, Walsall, Staffs, is entitled *Wet Air—Dry Air*.

This range of gas dehydration and humidity equipment is entirely designed, manufactured, and commissioned by the Company itself, thereby ensuring unified control of the equipment.

Pneumatic and Hydraulic Control Equipment

The new range of pneumatic and hydraulic control equipment manufactured by several U.S. companies is now available in the U.K. through the agency of British Arca Regulators Ltd, Sisson Road, Gloucester.

This equipment includes Skinner solenoid valves for most flow applications with port sizes $\frac{3}{4}$–1 in and pressure ratings 5–3000 psi; Rivett air-operated cylinders in bore sizes $1\frac{1}{2}$–12 in for pressures of 150 and 300 psi, and hydraulic cylinders of 2–10 in for pressures of 500, 1500, and 3000 psi; the Oil Dyne compact hydraulic supply unit comprising motorized pump on a reservoir with all necessary valve gear; Atkomatic solenoid valves of port sizes $\frac{1}{4}$–3 in, 1500 psi, and high pressure valves for up to 10,000 psi with port sizes of $\frac{1}{2}$–$\frac{3}{4}$ in; and Allenair air-operated rotary indexing tables of 4–24 divisions, available for automatic sequencing or hand operation.

British Arca also announces that the DB/IS double beat control valve, which was developed by its French associate, is now available in Britain.

Merox Unit at Pana Refinery

A 500 bsd UOP Merox unit is in operation at Pana Refining Company, Pana, Ill., treating thermal gasoline. The unit performs the dual function of mercaptan extraction and sweetening, and is a conversion of a regenerative caustic scrubbing unit and a copper treating unit. It is designed and licensed by Universal Oil Products Company.

Regent Motor Fuels and Oils

The Regent Oil Co. Ltd announced the introduction of two new brands of motor spirit on 31 May: *Regent Super* ("high octane") and *Regent Supreme* ("peak octane").

It is said that they have been particularly developed to overcome such problems as carburettor icing, by the development of a surface-active agent which coats the metal surfaces of the induction system and prevents build-up of ice in this area. By the same quality it is claimed that other problems, such as rust formation in the fuel system and carbon build-up in combustion chambers and on spark plugs, are countered, thus curing pre-ignition and mis-firing.

Previously, Regent introduced a new *Advanced Havoline* motor oil. It is of Supplement *1* engine performance class, having been engine tested in accordance with MOA specification DEF 2101B and BS 1905, except that a fuel having a sulphur level of 1.0 wt per cent was used in the CRC L-1 engine test phase. Oxidation characteristics, sludge formation rating, and bearing weight loss are confirmed by results of the CRC L-4 test procedure for heavy duty engine oil.

Kellogg Olefin Plants

Highlights of a new *Kelloggram* just published by The M. W. Kellogg Company include a study of olefin plants and a description of the Kellogg olefin process.

A flow sequence of an olefin plant and a flow sheet design for an ethylene operation illustrate Kellogg's approach to engineering and constructing olefin facilities. A chapter on pyrolysis discusses the part it will play in future olefin supply, and another section of the 12-page brochure cites recent advances in olefin-plant engineering. Economic significances of olefin plant designing are also discussed.

Copies of the new *Kelloggram*, "Olefin Plants" are available in the U.K. from Kellogg International Corp, Kellogg House, 7 Chandos Street, London, W.1.

James North Conversion to Nylon

James North & Sons Ltd, Kirkman House, 54A Tottenham Court Road, London, W.1 has announced that henceforth all chemical-resistant garments will be supplied in *Northylon* low twist high-tenacity, nylon fabric coated with green pvc. This will supplant its previous cotton based pvc garments, which will be discontinued.

The Company is also now engaged in the manufacture of *Northylon* covers, salvage sheets, and tarpaulins.

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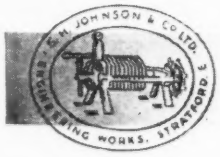

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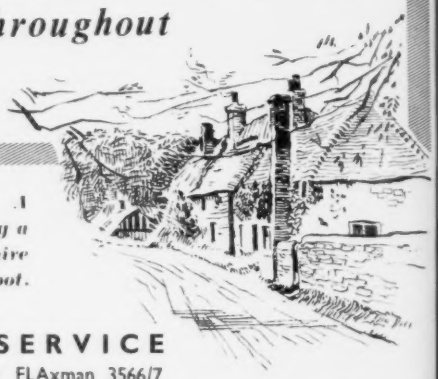

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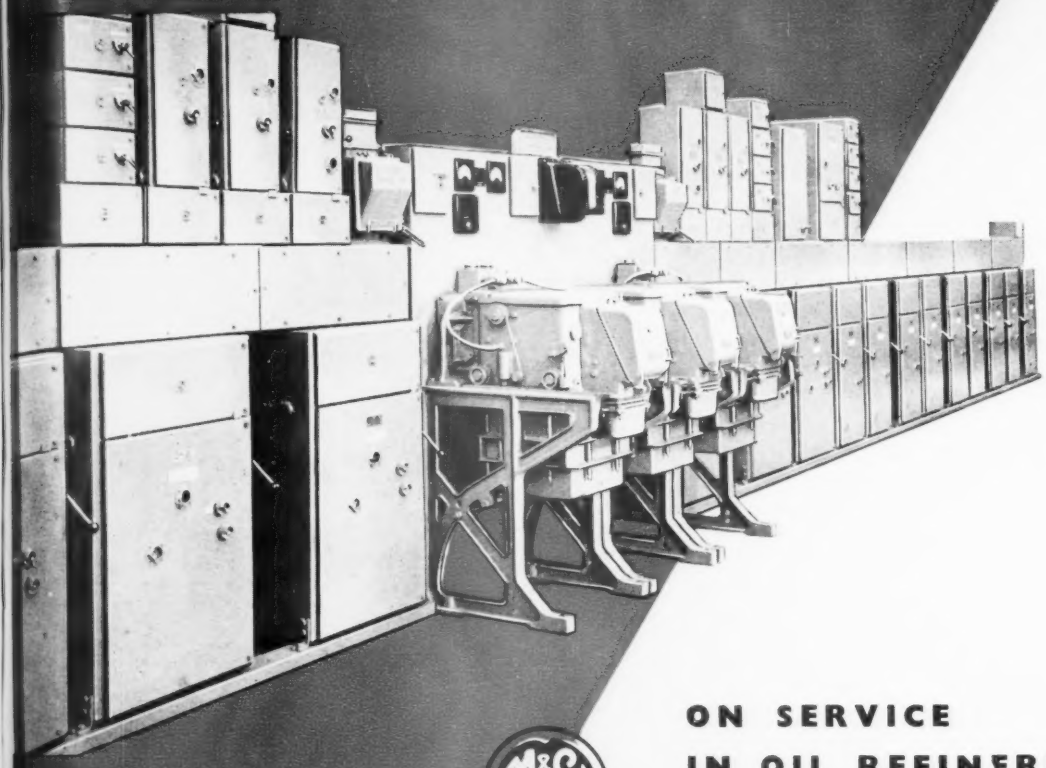

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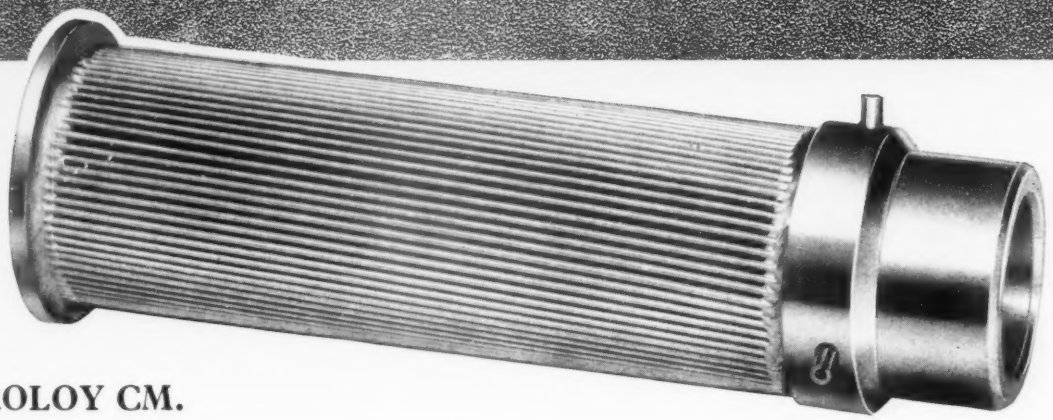

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The illustration (above right) shows the many sizes and forms—seamless tubes, flat discs, corrugated elements etc.—in which Poroloy can be manufactured.

Both filter elements are manufactured in conditions of micro-cleanliness and before despatch are individually checked for performance in the bubble point testing equipment (right).

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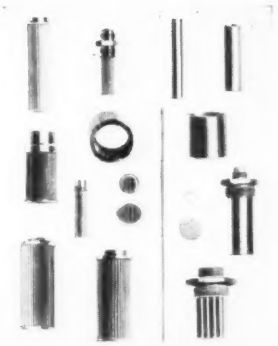

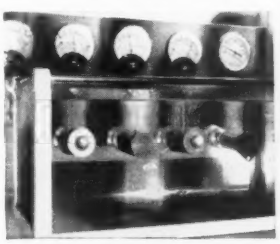

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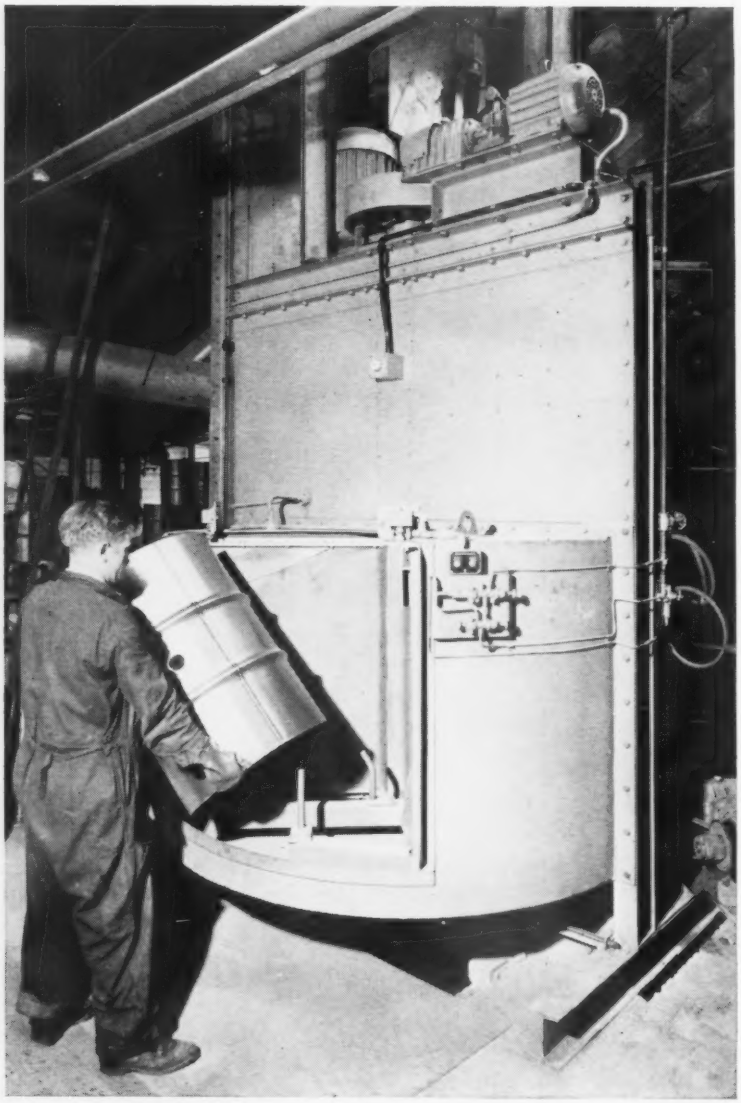

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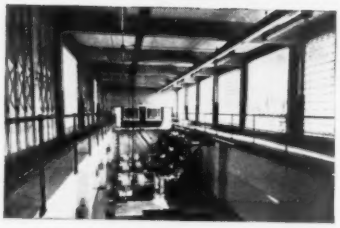
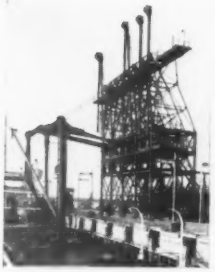
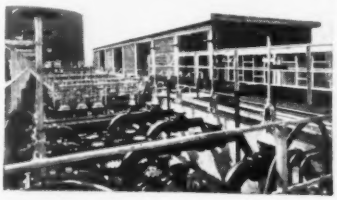


Interior of new electric pump house. Pumps ensure rapid delivery of the heaviest fuel oils.





Manifold pits housing pipe line headers and control valves. (*Above*)

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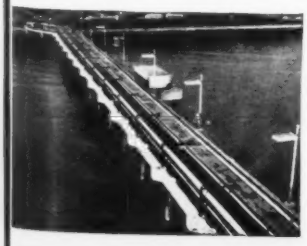

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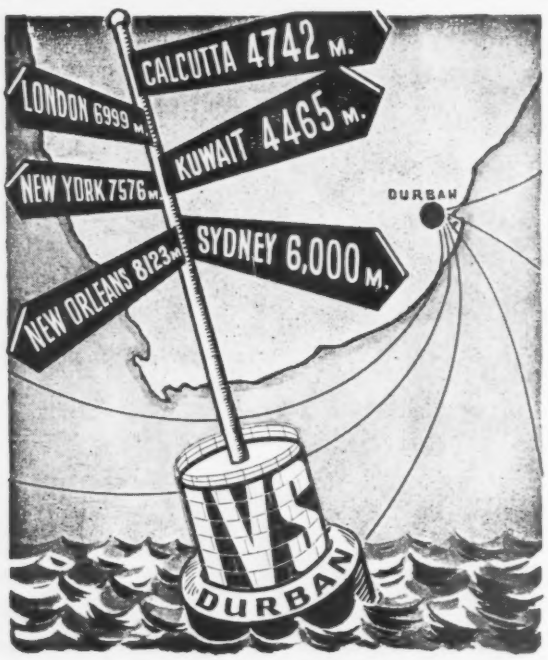

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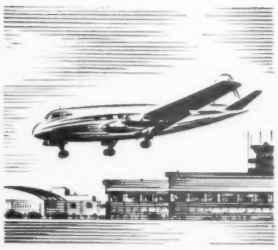

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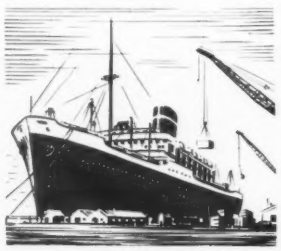

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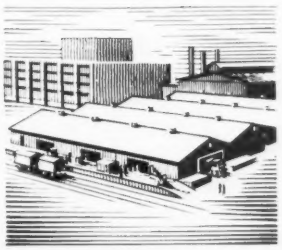

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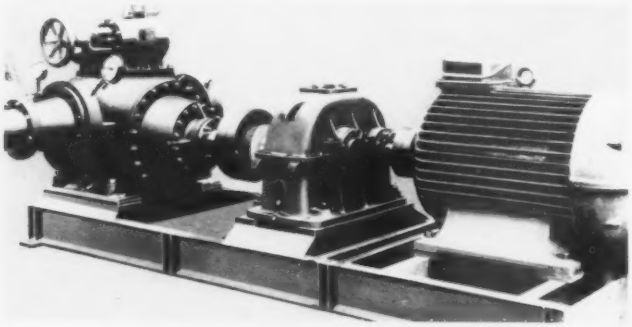

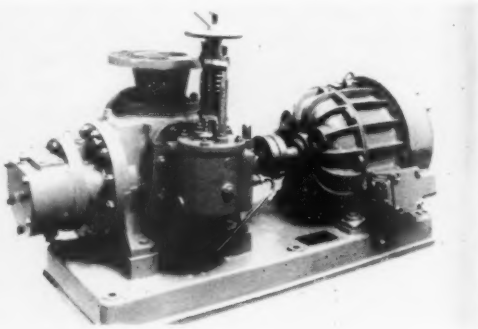

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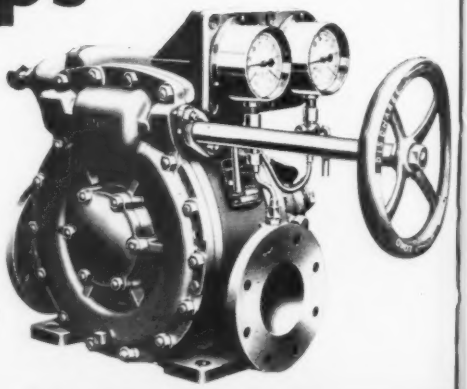

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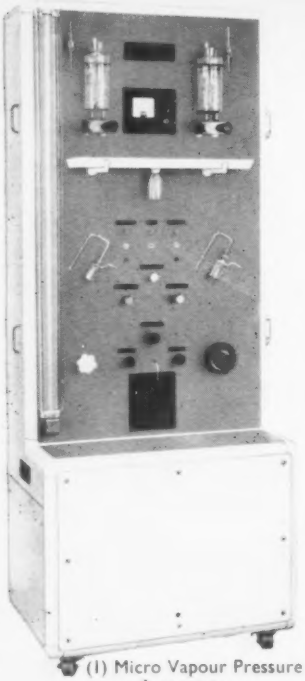

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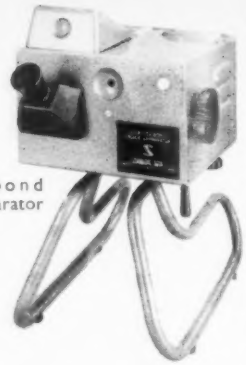

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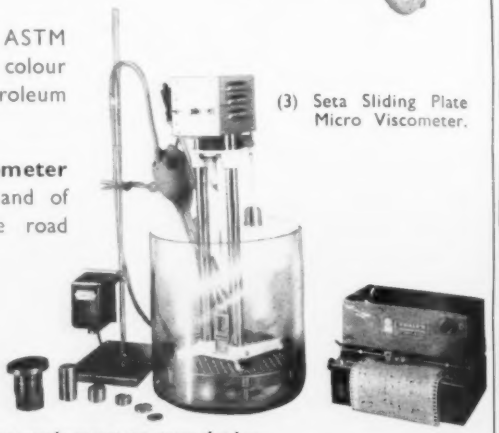

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